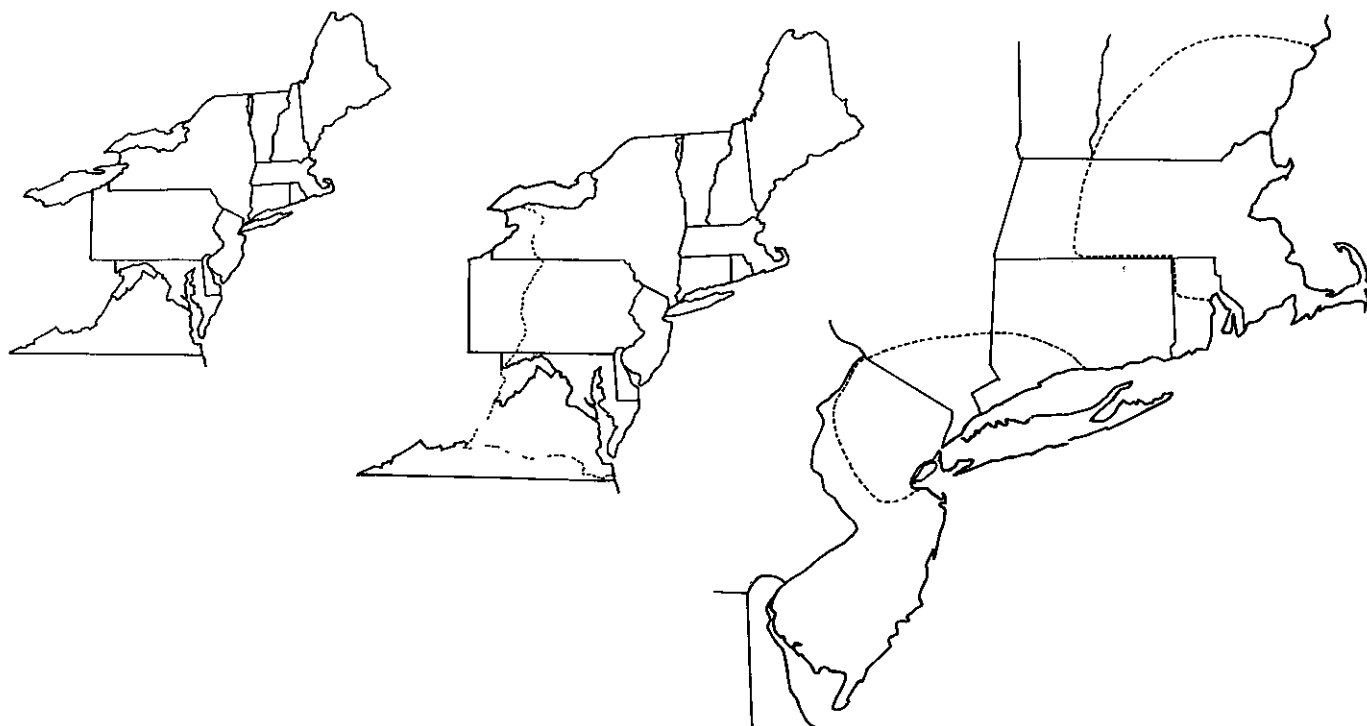


NORTHEASTERN UNITED STATES WATER SUPPLY STUDY

REGIONAL WATER SUPPLY; INSTITUTIONAL ASPECTS

VOLUME III



JULY 1972

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JULY 1972

IMPORTANT NOTICE

This report entitled "ORGANIZATIONAL, LEGAL, AND PUBLIC FINANCE ASPECTS OF WATER SUPPLY FOR SOUTHEASTERN NEW ENGLAND AND THE METROPOLITAN AREA OF NEW YORK CITY - NORTHERN NEW JERSEY - WESTERN CONNECTICUT" was prepared by the Institute of Public Administration, New York, New York, under contract with this office. It was prepared as a part of the overall Northeastern United States Water Supply (NEWS) Study, authorized for accomplishment by Public Law 89-298, and assigned to the North Atlantic Division Engineer for accomplishment.

Attention is invited to the preliminary nature of the study for which the report has been prepared. Two preceding studies developed the physical possibilities of water supply regionalization for each area and presented feasible engineering alternatives by which it might be accomplished. The attached report is concerned with an analysis of the organizational, legal, and economic problems, and alternative solutions to those problems. The results of the two engineering feasibility studies supplemented by the results of this institutional feasibility study, constitute the tools with which the Corps of Engineers and other agencies and organizations concerned may reach a decision on which of the various alternatives more detailed study effort should be concentrated.

The reader is cautioned that the Corps of Engineers does not advocate at this time, either in whole or in part, any of the alternatives set forth.

ORGANIZATIONAL, LEGAL AND PUBLIC FINANCE ASPECTS
OF REGIONAL WATER SUPPLY

V o l u m e I I I

STATE SURVEYS

By the
Institute of Public Administration
under contract with the
Department of the Army
North Atlantic Division, Corps of Engineers
as a part of the
Northeastern United States Water Supply Study
Contract No. DACW 52-69-C-0002

1 9 7 2

Other Volumes of the Study:

Volume I: Report

Volume II: Organizational and Legal Alternatives

Background materials and economic analyses prepared by the
Institute of Public Administration are also available.

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V O L U M E I I I

STATE SURVEYS

INTRODUCTION

This volume includes five chapters which summarize IPA's analysis by state (or portions thereof) of the NEWS region: New York, Connecticut, New Jersey, Massachusetts and Rhode Island. These chapters provide capsule reviews of the work performed in order to "develop alternatives potentially applicable to the study area," to "determine the extent and degree to which the existing legal framework will permit, encourage, restrict, or prohibit the development of regional water supplies," and to "choose and evaluate [existing] regional organizations on the basis of the potential for adapting their organizational framework to the regional solution of the water supply problems of the study area," and providing "for financing the engineering alternatives proposed to meet water needs."¹

The overall purpose of this study is "to develop feasible alternatives for the legal, economic and organizational framework necessary to create . . . regional water supply system[s] to serve the metropolitan area of New York City - Northern New Jersey - Western Connecticut, and . . . the Southeastern New England area."²

The feasibility of such governmental frameworks depends upon several generic and overlapping types of factor:

1. U. S. Department of the Army, Northeastern United States Water Supply Study, Contract No. DACW 52-69-C-0002.
2. Ibid.

1. Existing and prospective processes for making relevant collective decisions.
2. Existing organizational-legal structure.
3. Existing trends in reorganization.
4. Distribution of control over essential resources (financial, natural, political).
5. The tasks (i.e., functions and projects) for which the framework is tailored.
6. The patterns of costs and benefits, opposition and support associated with those tasks.
7. The management characteristics of the functions, particularly water supply.

Hence the work required to develop the generalizations entailed extensive interviewing and documentary analysis in the field. Because the data and the existing structures fall fairly easily into state categories, the work is reported on herein in that rubric. Each state chapter summarizes findings with respect to the crucial factors identified above.

It is perhaps, useful to comment briefly, on the state of the art of organizational analysis. There was a time when noble minds sought organizational imperatives-- rules and categories of structure and management that could be utilized to construct models among which practitioners could select.³

3. E.g., "The Study of Administration" by Woodrow Wilson (Political Science Quarterly, June 1887) and The Principles of Scientific Management by F. W. Taylor (1916).

Several decades of case study, however, informed the discipline of public administration that each abstract model varied enormously in its applied behavior depending on the job to which it was harnessed, the sociopolitical forces which worked through it and the economic effects of its activities. As a result, the work reflected herein, is essential to effective design of regional alternatives. To pose, for example, abstract models of regional corporations, or federal-state partnership arrangements, or interstate compacts, without confronting the actual constellation of tasks (outputs) to which they would apply in this situation, would be an exercise of little use. Moreover there are many existing regional organizations concerned with water supply in the NEWS area which inevitably are the building blocks of several key alternatives.

Because this methodology requires discussion of particular places, agencies, projects and viewpoints, it becomes important for the reader to keep in mind that the presentation is illustrative. Any particular strengths or weaknesses cited with reference to a given arrangement or option must be fitted into an overall context that includes the reader's goals and comparison with all other major options. This report seeks to do neither. It does not purport to judge but to shed light on effective ways of judging.

C h a p t e r 1

WATER SUPPLY FOR NEW YORK

INTRODUCTION

The purpose of this chapter is to examine the organizational structure and process to meet future needs for water supply development for New York City and the counties of Suffolk, Nassau, Westchester, Rockland, Orange, Putnam, Dutchess, and Ulster. The chapter will consider various organizational, legal and nonmonetary economic characteristics of the state and local institutions that will influence outcomes of alternative approaches to regional water supply development.

During the drought of the early 1960's, rationing measures had to be taken to prevent a serious crisis in New York City. The system was unprepared for a drought of that magnitude. According to the draft Joint Venture report,⁴ the population of the study area will increase from about 13.4 million persons in 1980 to nearly 18.3 million by the year 2020, with a corresponding increase in demand. The table below shows the water deficits that are expected in the years 1980, 2000, and 2020, if action is not taken to alleviate the present conditions.

4. Metcalf & Eddy, Inc. and Hazen & Sawyer, Alternative Regional Water Supply Plans for Northern New Jersey, New York City, Western Connecticut Metropolitan Area (draft) Feasibility Report, prepared for the U. S. Department of the Army, Corps of Engineers, North Atlantic Division, Contract No. DACW 52-69-C-0001, August 1969, p. 3-4.

POTENTIAL WATER DEFICITS
IN THE STUDY AREA

Jurisdiction	Million Gallons Per Day		
	1980	2000	2020
Dutchess	a	a	a
Nassau	-	52	96
Orange	-	31	89
Putnam	-	12	23
Rockland	-	-	7
Suffolk	a	a	a
Ulster	a	a	a
Westchester	50	102	178
New York City	<u>100</u>	<u>253</u>	<u>447</u>
Totals	150	450	840

a. Supplied by local sources.

Source: Metcalf & Eddy, Inc. and Hazen & Sawyer, Alternative Regional Water Supply Plans for Northern New Jersey, New York City, Western Connecticut Metropolitan Area (draft) Feasibility Report, prepared for the U. S. Department of the Army, Corps of Engineers, North Atlantic Division, Contract No. DACW 52-69-C-0001, August 1969, p. 3-4.

The Joint Venture report cites the Hudson River as the principal new source of water for southeastern New York. Major project alternatives include construction, in stages, of various combinations of reservoirs upstate for flow augmentation of the river at Hyde Park where withdrawals would be made. Several projects contemplate interbasin

transfers of water for flow augmentation, and another project-- flood-skimming the Hudson-- would probably not necessitate the construction of reservoirs until sometime near the end of the study period.

A principal issue is whether the present organization is capable of carrying out the kinds of projects listed in the engineering report. In particular, can the New York City Board of Water Supply continue to be almost totally responsible for new sources? While water supply development has generally been carried out locally, some characteristics of the engineering proposals may call for increased participation by higher levels of government-- regional, state or federal. Interstate projects, for example, would require state negotiations, and the federal government would have to be a participant in the construction of projects recommending the use of international bodies of water. On the other hand, dams in the Adirondack State Park can only be built and operated by the state or federal government under current legal provisions.

Another issue is how counties north of New York City might be supplied with water in the future and whether the existing organizational structure can provide the increased amounts needed. At present the city is a regional supplier. It is required by statute⁵ to furnish water to the eight counties through which its aqueducts run, including the study area counties of Ulster, Orange, Westchester, and Putnam. The city does

5. New York City Administrative Code, Title K, Chapter 51, §42.0. (New York State Laws of 1905, Chapter 724, §40, as amended most recently by L. 1966, Chapter 354, subdivision f repealed.)

not have such an obligation to Dutchess or Rockland which are also in the study area. Are present supply agreements adequate, or do the engineering projects call for a new approach?

On Long Island, underground sources are judged sufficient to supply Suffolk County through 2020, but Nassau will probably have to import water by the late 1980's. This will require cooperation between Nassau and either New York City or Suffolk. An important question, however, is whether the two Long Island counties can achieve the organization required to effectively use their sources.

ORGANIZATION FOR WATER RESOURCES MANAGEMENT

In New York State, water supply development has traditionally been a local function. The state government has had responsibility for water quality control and standards, for allocation of sources, and in recent years has been active in planning.

New York City Board of Water Supply

The dominant water development agency in the study area is the New York City Board of Water Supply, established in 1905. It is composed of four commissioners, including ex officio the administrator of the Environmental Protection Administration (EPA).⁶ The other three commissioners are appointed by the mayor for life tenures. The board is responsible for investigating, planning and constructing new sources of water supply for New York City. Once constructed, the projects are turned over to the

6. The commissioner of EPA was added to the board by an amendment to the Water Supply Act in 1969.

Bureau of Water Supply in the Department of Water Resources for operation, maintenance and distribution of water.

The development of the New York water supply system began with the Croton system which was partially in operation by 1842 and was completed by 1891. Since it was found that the development of new sources was discouraged by the then existing organizational structure, which combined construction, operation and maintenance in one agency, the Board of Water Supply was created by state law in 1905 expressly to handle new source development. The board planned and undertook the construction of the Catskill system. It was in operation in 1915 and expanded in 1924, but new sources were again needed for the city. After studying the problem, the board applied to the state for the right to build the Delaware system. Upon the state's approval, the city began work on the project which was to include Rondout, Neversink and Pepacton Reservoirs, tunnels, and the Delaware Aqueduct. Downstream states turned to the United States Supreme Court in an attempt to prevent New York's use of the Delaware River as a water source. The court's decision resulted in a decree in 1931 permitting the construction of the reservoirs. New York was allowed to withdraw only 400 mgd from the Delaware, and certain releases to the main river were required.

The Depression and World War II delayed the city's ability to float its general obligation bonds for the Delaware water supply projects. Much of the Neversink and Rondout Reservoirs were completed by 1951; Pepacton was completed about 1955, but there was again a water shortage in

New York City. Foreseeing the shortage, the city went back to the Supreme Court in the 1950's for changes in the Delaware River decree, and asked permission to build Cannonsville Reservoir. The state of Delaware intervened at that time. The negotiations lasted from 1951 to 1954. The court decided that New York should be allowed to build Cannonsville and that the city should be permitted to take up to 800 mgd from the Delaware. However, at the same time the release obligations were increased.

The water supply system was planned, therefore, by New York City, financed by the city through general obligation bonds, and constructed by a Board of Water Supply contract. All projects have been turned over to the Bureau of Water Supply for operation and maintenance.

The projects of the Board of Water Supply require approval of the Board of Estimate. The Board of Estimate is composed of the mayor (chairman), the comptroller, president of the council, and the presidents of the five boroughs. Requests by the Board of Water Supply for capital budget funds are reviewed in a regular process by the City Planning Commission, the mayor, the Board of Estimate and the City Council. The amount of capital budget funds that may be spent for water supply is not restricted by the city's debt limit.

The water supply development process does not have its own budgeting system. All revenue obtained from water distribution in the form of user charges goes into the city's general funds, and all money for development and maintenance of the system comes out of the city's

general capital and operating budgets. Water supply capital debt for the purpose of water supply development is funded from taxes, so that when the city issues such bonds it can also raise the real estate tax. These increases in real estate tax may exceed the otherwise legal ceiling for such tax which is 2.5 percent of the five-year average of full value of taxable real estate. The city's budget difficulties are such that increasing water supply revenues that flow into its general funds and maximizing the real estate tax rate are both very high priorities to its government.

Unlike water supply capital funds, the legal ceiling on the real estate tax is applicable to raising money for the operating budget. Operating funds for water are less plentiful than capital funds; a project with a high capital cost but low operating cost is more attractive to New York City than a project with a high operating cost. Increased user charges would not make up the difference, because insofar as the administration does raise them, it seeks to maximize their contribution to the general budget for other, more pressing functions.

The relationship of the city water agencies to the state government is good. The state is legally responsible for allocating water sources, for reviewing completed projects and for supervising public health aspects of the water supply projects. The state government does not presently provide financial assistance for local water supply development (except for planning), although the state's Water Resources Commission and Division of Water Resources recommended that the state

consider offering such assistance.⁷ Both the new state Department of Environmental Conservation and the Governor's Commission on the Water Supply Needs of Southeastern New York intend to address themselves to need for changes in financial arrangements.

The federal government has not played a role in water supply development in New York City. The city might favor being able to borrow from the federal government in times of depression or crises, but officials interviewed seemed not to favor a more active federal role in development or management at the present time.

In 1966 when the city administrative reorganization was being studied, proposals to bring the Board of Water Supply under the city Environmental Protection Administration in order to consolidate all water resource-related functions did not succeed. A proposal is presently under consideration by various city officials to form an independent utility bringing together the sewerage, waste treatment, and other water resources functions. Until 1963, sewers were installed only on petition of residents, and construction was paid for by assessing the affected properties. Since this process discouraged sewer construction, the city took over the decision-making and financial responsibilities. As a major advantage of incorporating the water supply function into the utility, the water agencies would no longer have to go through the budget process

7. Developing and Managing the Water Resources of New York State, New York State Water Resources Commission and the Division of Water Resources, Conservation Department (Albany, New York, 1967), p. 6.

for each expenditure item as well as for the original allocation. Once the budget had been allocated, the utility would be relatively independent in making expenditure decisions. No action has yet been taken on this proposal. It should be noted that any change in the present Board of Water Supply would require state legislation since the board was created by state statute, and the formation of an authority would also require special state legislation.

Although the Board of Water Supply has successfully constructed the present water facilities, future developments are likely to require more participation by higher levels of government. In the first place, the state constitution requires that any reservoirs in the Adirondack State Park be constructed, owned, controlled, and operated by the state.⁸ Second, the complexity of the needs of the counties surrounding New York City may be sufficient to require a different regional approach. Furthermore, a budget problem could be posed for the city by projects with relatively high operating costs. Considering the increased interest in conservation and awareness of the value of "wild" areas, and the general suspicion that upstate source areas have of New York City, development of projects might be more politically feasible by a government with a broader jurisdiction.

8. New York State Constitution, Article 14, §2.

State Organization for Water Supply Development

The state water resources apparatus was reorganized in 1970, but the process of decision-making and division of functions within the new Department of Environmental Conservation have not yet been finally determined. Previous to the reorganization, water resources planning and policy-making were centered primarily in the Water Resources Commission (WRC) and the Division of Water Resources in the Department of Conservation.

The WRC was an interagency commission composed of the head of the Office of Local Government, the superintendent of public works, the attorney general, the commissioners of conservation, agriculture and markets, commerce, and health, and four lay advisory members chosen by the governor to represent industry, political subdivisions, agriculture, and sports interests. The Water Resources Commission coordinated water resources activities in the state, and formulated state policy in relation to the conservation, development, and use of water resources. It was responsible for seeing that statewide water resources plans were drawn up as an input to the work of the Office of Planning Coordination (OPC).⁹ The WRC also allocated water sources for public water systems. It inspected water quality of projects, regulated well drilling on Long Island, issued licenses to power companies for the use of certain streams

9. OPC was abolished and a new state agency-- the Office of Planning Services-- was given responsibility for the state planning functions on April 1, 1971.

classified for pollution control, and was responsible for river regulation and improvement, flood control, intermunicipal water supply planning, and drainage of agricultural land. The WRC was a policy-making and quasi-judicial agency rather than an operating agency.

The Division of Water Resources in the Department of Conservation provided the staff services for the Water Resources Commission and more particularly, prepared the plans-- about 70 percent of the division personnel was devoted to planning. It also coordinated water resources activities of various state agencies, collected data, and reviewed water project proposals and plans, and made recommendations to the commission. Seven departments and several other agencies have been involved in water resources development. The departments included health, public works, agriculture and markets, law, commerce, public service and conservation.

State Planning

There have been several different kinds of plans for New York State water resources. After the 1960's drought, the state was divided into four regions for the purpose of developing "reconnaissance" studies of short- and long-term needs. Information gathered concerned the availability of water, possible reservoir sites, water supply needs, cost estimates for alternative programs, and multipurpose considerations. These plans were developed with river basin perspectives.

Regional water resources planning boards prepare a second kind of plan, which is more county-based than river basin-based. Two or more counties may request that the state form a board in their region. Such

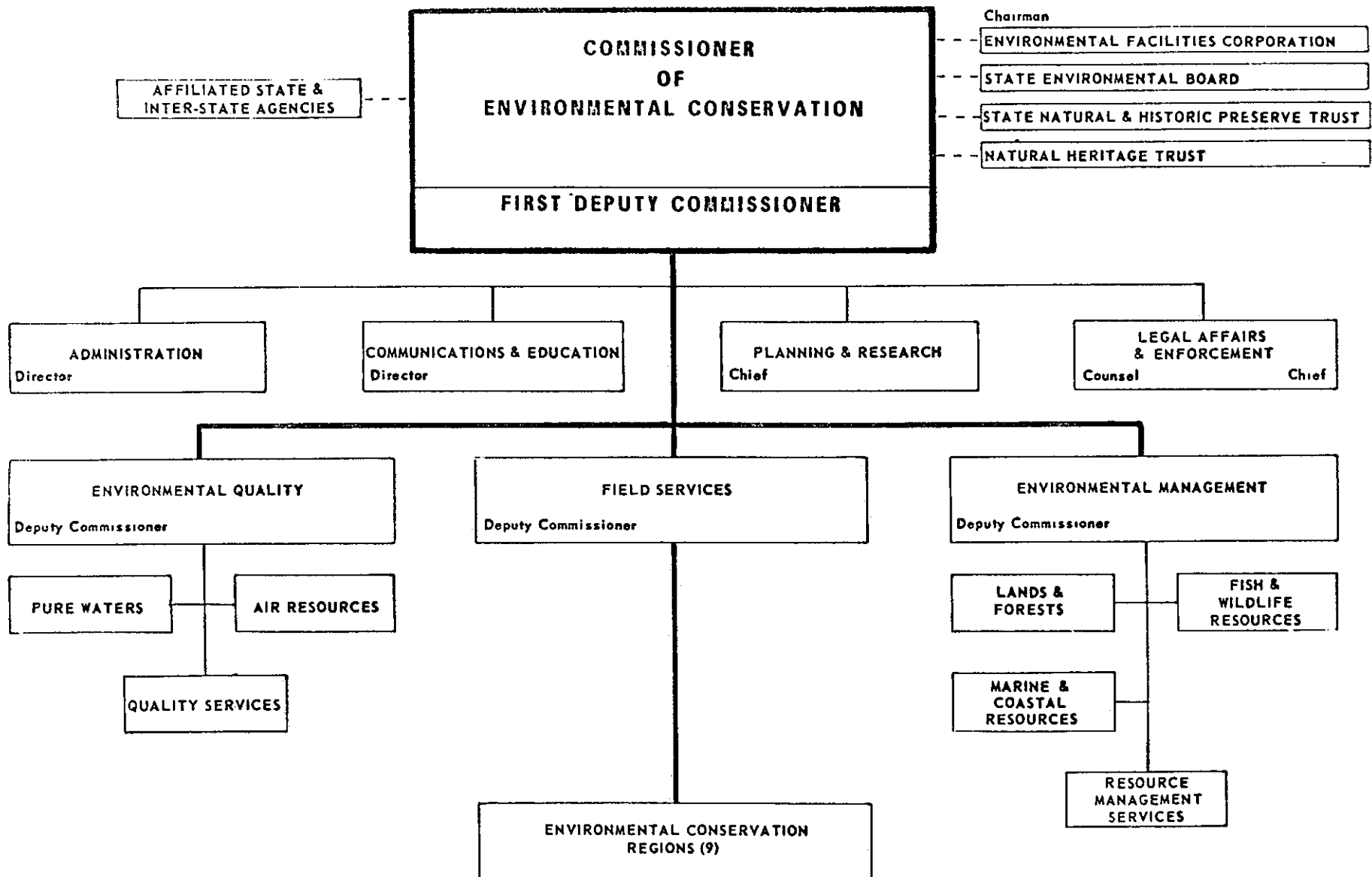
a board would be composed of seven members chosen by WRC (from nominations submitted by the county legislatures). Five members must be from different interest groups including municipal corporations, agriculture, industry, fish and wildlife (and outdoor recreation), and public water supply. The board is responsible for preparing comprehensive plans in cooperation with local, state and federal agencies. The Division of Water Resources and its field agencies provide the staff for the board programs. The state contributes 75 percent of the cost of these regional studies and the rest is paid for by the counties themselves once the studies are completed. After approval by the Water Resources Commission, these studies become the accepted plan for that region.

The third type of plan, generally known as the V-A studies, is administered by the Department of Health. It is a single purpose engineering and economic feasibility study for providing water supply in shortage areas. The state pays 100 percent of the cost of such studies. Before the Water Resources Commission approves these studies, the Division of Water Resources reviews them for coordination with the Regional Planning Board studies discussed above. The Comprehensive Public Water Supply Study for the City of New York and County of Westchester, completed in 1967, is an example of this kind of plan.

The Division of Water Resources was responsible for providing the Office of Planning Coordination (OPC) of the state with water resources plans. The Department of Environmental Conservation will assume the responsibility of drawing up plans. OPC was the central state office for

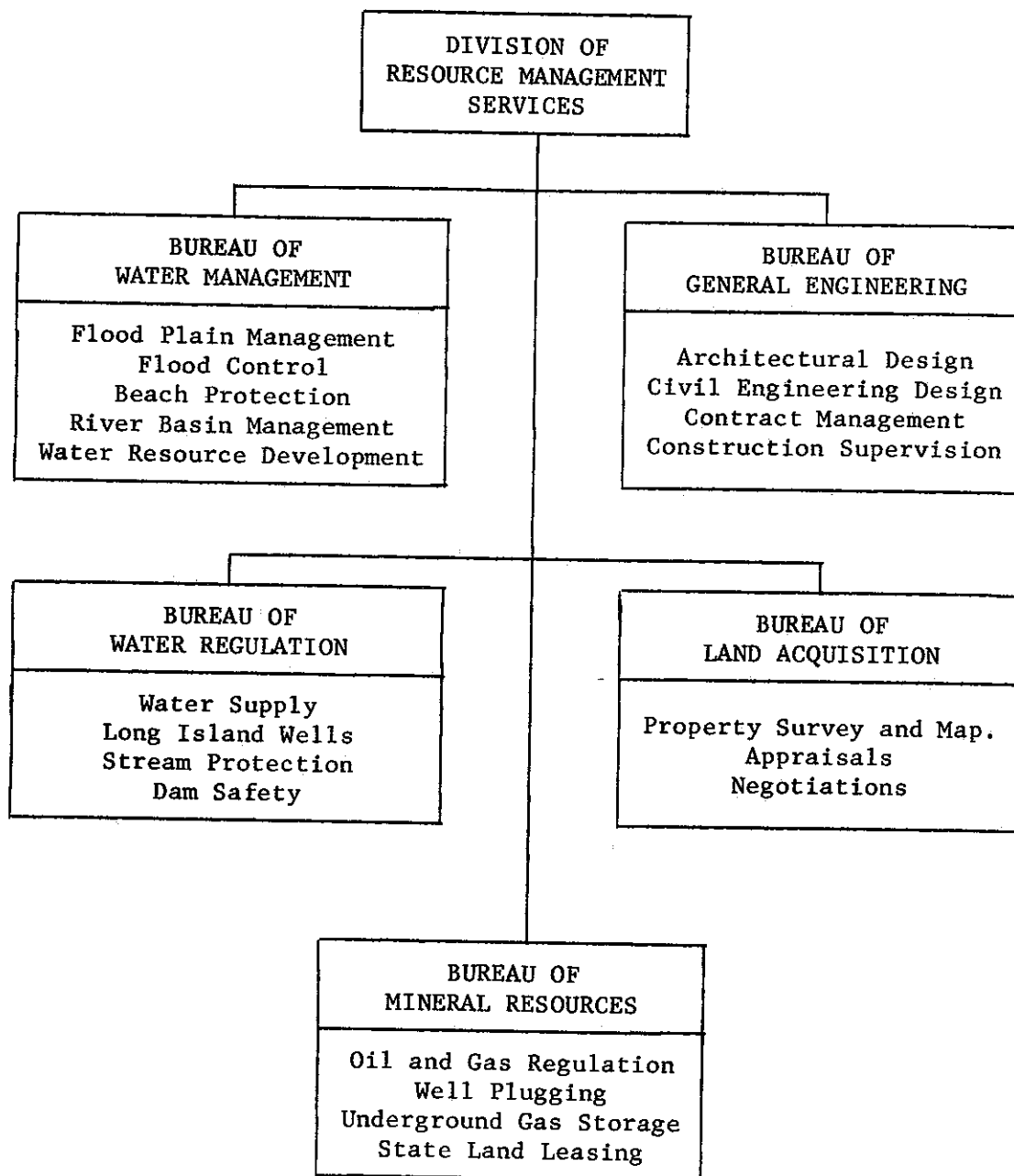
Chart 1

TENTATIVE ORGANIZATION OF NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION



C h a r t 2

TENTATIVE ORGANIZATION OF THE
DIVISION OF RESOURCE MANAGEMENT SERVICES



Source: New York State Department of Environmental Conservation

coordinating comprehensive regional development plans relating to all functions of state interest: housing, residential planning, education, health, human resources, recreation and culture, public safety, transportation, economic development, natural resources and government. There are also various state-federal and interstate water resources planning studies.

Department of Environmental Conservation

In 1970 in order to establish a state policy for environmental protection, the Department of Environmental Conservation (ECON) was formed. The Conservation Department (including the Division of Water Resources) and the Water Resources Commission were abolished and their functions turned over to the new department. Air and water pollution control and solid waste functions were transferred to ECON from the Department of Health, the Air Pollution Control Board and the Pesticide Control Board. The Department of Health, however, has maintained its control over quality and sanitation standards for public water supply and its responsibility for comprehensive single purpose water supply plans under Part V-A of the Conservation Law. The bill which created the Environmental Conservation Department also provided that the commissioner of health should have emergency powers to order the abatement of activities which it considers hazardous to the public health. Formation of ECON means that there is consolidation into one agency of several water resource-related functions which previously had been separated.

One of the significant features of the new department is that it focuses water resources planning (with the exception of the V-A studies) into one agency. Although the internal structure of the new department has not fully taken shape, tentatively, the planning process will be the task of the Division of Planning and Research, the regulatory function will be exercised by the Bureau of Water Regulation in the Division of Resources Management Services, and WRC's policy-making functions have been transferred to the commissioner of the department. The department will be responsible for formulating an environmental plan.

A state environmental board composed of citizens and state officials approves environmental standards and will have a role in coordinating interagency projects. The new Council of Environmental Advisors is composed of seven citizens appointed by and responsible to the governor. The details of its function are not yet clear. The department is presently working on preparation of new policies for the protection and management of the environment.

The Executive

The governor has not yet expressed his position on the water supply source issue although it is clear that he will have an important role in formulating state policy related thereto. Republican dominance of the present legislature should enhance the governor's role in this matter if he decides to take an active part. The governor created two important commissions in connection with the water resources problem.

The first, which reported in December 1970, is the Commission on the Future of the Adirondacks.¹⁰ It recommended the creation of an agency responsible for planning and land use in the park. It recommended a system of zoning to allow for the preservation of certain areas for protection of the existing natural qualities, and for the controlled development of other areas. Its recommendations on water resources included the provisions that:

No further large-scale impoundments should be constructed within the Park for municipal water supply except as a last resort after all other alternatives have been shown to be unfeasible.

A substantial mileage of Adirondack Park rivers should be permanently protected from impoundments by state statutory enactment of the Wild, Scenic and Recreational Rivers proposals of the Commission . . . and by placing appropriate rivers under the Federal Wild Rivers Act of 1968.

No impoundment should be constructed at the Gooley site under any circumstances.

In view of the thousands of natural bodies of water in the Adirondack Park and the importance of preserving the free flowing streams and rivers and the wild forest character of the Park, no weight should be given to purported recreational benefits in the determination of cost-benefit ratios for proposed impoundments within the Park.

10. The commission was composed of the following members: Lowell Thomas, author, radio and television commentator, James C. Loeb, co-publisher of the Adirondack Daily Enterprise and Lake Placid News, Leo W. O'Brien, former congressman; R. Watson Pomeroy, former state senator; Henry L. Diamond, commissioner of ECON; Dr. Julian W. Anderson, assistant professor of oral surgery, Columbia University; Harold K. Hockschild, American Metal Climax, Inc.; Howard H. Kimball, Jr., businessman, Frederick O'Neal, president of Actors Equity; Peter S. Paine, Jr., lawyer; and Frederick Sheffield, lawyer.

The Care, Custody and Control Guidelines for the Adirondack Park Forest Preserve and the Park master plan should determine which portions of the Park might be suitable for impoundments without impairing the Park.

The effects of alternative water supply impoundment sites on the environment should be thoroughly investigated and public hearings should be held before any decisions on individual sites are made.

An appropriate body should review the jurisdiction, functions, powers, duties and obligations of the Hudson River-Black River Regulating District and the provisions of the Conservation Law concerning river regulating districts.¹¹

Although the 1971 session of the state legislature failed to act on the water resources portion of the commission's recommendations, it did create the Adirondack Park Agency to oversee public and private land use in the park. It is to be composed of the director of the Office of Planning Services, the commissioner of the Department of Environmental Conservation, and seven other members to be appointed by the governor and confirmed by the Senate. The agency is scheduled to submit a plan for the park by June 1, 1972.

The second commission is the Temporary State Commission on the Water Supply Needs of Southeastern New York to be chaired by Virgil Conway, president of the Seaman's Bank for Savings in New York City. Seven members were named by the governor, and four legislators each by the temporary

¹¹. New York State Temporary Commission on the Future of the Adirondacks, The Future of the Adirondack Park (Albany, New York, 1970), p. 16.

president of the Senate and the speaker of the Assembly.¹² The executive director of the commission is Robert D. Hennigan, director of the State University Water Resources Center at the State University College of Forestry in Syracuse. The report is scheduled to be released in December 1972.

According to the legislation (S. 5351, March 25, 1969), the commission is to examine existing plans and studies, and to review the future water supply needs of New York City, and the counties of Nassau, Suffolk, Westchester, Rockland, Putnam, Orange, Ulster and Dutchess, and to relate the needs to sources of supply; to study the "alternative methods for constructing, financing and administering the needed water supply facilities"; make recommendations for meeting the needs; and consider external effects of various alternative projects.

The Legislature

In any new development in which state financing is involved, the legislature must vote on the bonds for the project, and upon approval, a referendum is required on the issue.

12. The governor's appointees were: Virgil Conway; William J. Schickler, assistant general manager and chief engineer of the Suffolk County Water Authority; Anthony M. Quartararo, an engineer and lawyer; Gerald R. O'Brien, an attorney with Union Carbide Corp., also an engineer; Neil H. Anderson, vice president of the New York Board of Trade; James C. Harding, past commissioner of public works for Westchester County; and Herman Forster who has held the posts of deputy commissioner and assistant to the commissioner of the New York City Department of Water Supply, Gas and Electricity. The temporary president of the Senate, Earl W. Brydges, appointed Senators Jess J. Present, Anthony B. Gioffre, Jay P. Rolison and John J. Santucci. Speaker of the Assembly, Perry B. Duryea, appointed Assemblymen Benjamin A. Gilman, H. Clark Bell, who was designated as vice chairman, Robert C. Wertz and Thomas J. McInerney.

The state Assembly presently has 79 Republicans and 71 Democrats, the Senate has 32 Republicans and 25 Democrats. In the study area, the northern counties tend to be Republicans; New York City, Democrat, and Long Island, Republican. While the study area has enough votes to control the legislature, it is thought unlikely that the counties would vote as a bloc even in a case where they all might stand to benefit from legislative action. In addition, conservationist elements are strong in the city, and put considerable pressure on their representatives-- who are normally elected by a small majority-- to vote against certain bills which might otherwise benefit the constituency.

The legislature authorized about \$12 million for water resources planning in the 1960's as a foundation for a statewide plan expected to be completed by mid-1970. However, progress was disappointing and last year the legislature cut \$209,000 from the governor's original budget request of about \$395,000 for United States Geological Survey cooperative studies, and from the Regional Water Resources Planning Board fund request of \$455,000, they cut \$443,000. Some of this amount was restored later in the budget process.

It is difficult to predict what the role of the state will be in future water supply source development because of the political latency of water supply issues, the infancy of the new department, and the uncompleted response to reports of the two governor's commissions. An effort is being made to consolidate and coordinate the various types of planning being

conducted in the state. It is also clear that the state is about to reconsider its financial assistance programs for water supply development.

The state government is generally not interested in taking over New York City water supply development responsibilities, but it maintains that any construction in the Adirondack Park will have to be carried out by the state.

COUNTIES IN STUDY AREA TO THE NORTH OF NEW YORK CITY

The Joint Venture report assumes that Dutchess, Suffolk, and Ulster Counties will be supplied by local sources through the year 2020.

According to the New York City Administrative Code,¹³ Ulster, Orange, Westchester and Putnam are among the counties that may take water from any reservoirs, aqueducts, conduits, streams, or pipes of the city water supply system to be used by municipal corporations or water districts or villages. These governmental units may lay the mains, pipes, valves, hydrants, supply pipes, etc., to connect up with the water system, but they must pay for the development of their distribution systems. They must also pay the city "fair and reasonable water charges or rates," which the two parties agree upon, or, the Water Resources Commission (now the Department of Environmental Conservation) of the state, after hearings, may set fair and reasonable charges. Charges for water may not exceed the rates charged by the city to persons using water in the city, or the "actual cost of the water to the city after deducting from the total cost

13. New York City Administrative Code, Title K, Chapter 51, §42.0.

all construction costs and expenses of operation, maintenance and carrying charges incurred within the corporate limits of the city in connection with the distribution and delivery of the water within such limits."

The amount of water that a municipal corporation or water district receives from New York City may not exceed the per capita per day amount consumed in New York City itself (about 178 gallons per person per day).¹⁴ There has been a conflict over this law because the city and counties disagree over the meaning of the term "water district." The city maintains that it means only municipal water districts, and the counties believe it should include countywide water districts as well. Under the present circumstances, each municipality dealing with New York City is limited to 178 gallons per residential person per day even though some communities use far more water than that amount. Where a large water-using industry or a business center is located, water needs are likely to be greater than in a dormitory community; yet there is no provision for transfers of excess water in one municipality to another with greater need for it. The city is allowed to deal only with public water systems. A further problem is generated for New York City where a large proportion of a county population is served by privately owned wells and private systems, because the city is obligated to provide 178 gallons per resident per day even though many residents may not use the public system. Counties

14. The average per capita use in 1969 was 164 gallons, and in 1970 was 178 gallons. The 1971 use figures are expected to increase still further.

through which the city's aqueducts flow may, and do, charge taxes on the facilities.

Westchester County

Westchester anticipates major increases in supply needs in the future. Water consumption is projected to reach 145 mgd by 1980-- 9 mgd for industrial and 136 mgd for nonindustrial purposes. By 2000, the industrial consumption is expected to reach 11 mgd and the nonindustrial use 189 mgd; and by 2020, the industrial consumption would be 15 mgd and the nonindustrial 261 mgd, bringing the total to an estimated 276 mgd.

Presently Westchester County obtains about 75 percent of its water from New York City and the proportion is expected to increase. Westchester does not have a convenient source of its own. For example, in order to use Hudson River water, Westchester would have to build a pipeline up to about Hyde Park, and this undertaking would be extremely expensive for the county.

Westchester has been restricted by the water supply limitations set by the city. North Tarrytown with its General Motors Company plant and hospital, for example, uses about 230 gallons per person per day. New York City charges the normal rate for the amount North Tarrytown would normally be allowed to have, and bills the locality a higher rate for the amount above the gallonage that the town is allotted.

Conflict between Westchester and New York has also occurred over rate schedules. The price Westchester pays for water is far below the amount being paid in New York City. The county is paying between \$80 and

\$120 per million gallons, while the price for metered water in the city has risen to \$700 per million gallons.

The history of rate changes shows that in 1938 there was agreement to increase the prices to \$70.19 per million gallons for Croton Reservoir water, and to \$105.28 for water from the Delaware-Catskill system. The New York City Department of Water Resources reevaluated the situation in 1966 and concluded that the costs of supplying water had risen. In 1967 letters were sent to the outlying communities served announcing rate increases to \$80 per million gallons for the Croton water source, and \$120 for the Delaware-Catskill source. These rates were never agreed to by the communities (as is required by law), and some of them still pay the 1938 rates. New York City has not yet sued for the back payments.

In November 1970, Metcalf & Eddy released a report they had prepared for the city on the rate schedules.¹⁵ Copies were sent to the relevant communities along with letters regarding recommended higher rates. The price for Croton water was to be increased to \$124 per million gallons, and for water from the Delaware-Catskill system, to \$149. Hearings on the report were held by the state Department of Environmental Conservation on May 11, 1971 at which time Westchester was granted the right to draw up its own report regarding the rate schedule. A second hearing is to be held about four months after the first.

15. Metcalf & Eddy, Inc., Report to City of New York on Water Rate Study (New York, November 17, 1970).

In sum, the city believes it should be obtaining a higher price for the water, and the county believes it should be able to obtain and distribute the water on a regional basis.

Other Counties

The legal relations between the city and all eight of the counties through which its aqueducts run are the same, as defined by the legislation discussed at the beginning of this section. Furthermore, all the counties share, to some extent, the problems discussed above in connection with Westchester.

The engineering report does not make any special additional provisions for supplying Putnam County with water, although it will have a small deficit of about 12 mgd by the year 2000, and 23 mgd by the year 2020. Putnam County is served by about 64 small water systems. About 46 are year round water systems serving 41 percent of the citizens. The rest of the population is served by private wells. Five of the municipal systems and seven of the private systems have surface water sources. Three of the municipalities and 31 private systems have ground water sources. There are 14 additional systems especially for the seasonal population.

Putnam County expects to obtain most of its small additional needs through the year 2020 from the New York City system. The Cold Spring area of Putnam County-- near the Hudson River-- will probably be using ground water. Like Westchester County, Putnam County has one

of the city's aqueducts running through it and is therefore covered by the Administrative Code discussed above.

A problem for New York City is demonstrated by the situation in Putnam where 59 percent of the population is served by privately owned wells, and most of the water supply utilities are private. New York City will deal only with public systems, yet less than 50 percent of the county population would be using public systems.

A recent report of the Rockland County Planning Board¹⁶ notes that there is no immediate shortage of water in the county, but that there will be a need in the future to find a source outside its boundaries. There are two alternative sources. One is to tap the Ramapo River and store the water in reservoirs. Two of the proposed reservoir sites are in Orange County and the third is in Palisades Park in Bergen County, New Jersey. The second alternative is to link up to a New York regional system.

Although the draft Joint Venture report assumes that water will be supplied locally, the Ulster County Comprehensive Water Supply Study, which came out in July 1970, recommends, as the next major source of water, tapping both the Delaware and the Catskill Aqueducts which go through the county on their way to New York City. Ulster has the legal right to withdraw water; the water is of good quality and would require little treatment, the aqueducts are located near centers of population;

16. Rockland County Water and Sewer Study: Rockland County Comprehensive Planning Program (New York City: Rockland County Planning Board, 1970).

no additional pumping or pressure would be required for delivery; it is the least expensive source; and consumers would probably prefer aqueduct sources over the Hudson even though the latter could be treated thoroughly. The plan projects that total water usage in the county will rise from 8.52 mgd in 1967 to 46.5 mgd in 2020.

In any event, it is clear that there will probably be an increasing demand on the New York City water supply system from the northern counties.

CONSTRUCTION OF UPSTATE RESERVOIRS TO SERVE NEW YORK CITY

The Joint Venture report has listed alternative projects for obtaining water from the Hudson River, of which six illustrations will be discussed in this chapter. Each project consists of a combination of withdrawal facilities at or near Hyde Park, and includes a combination of possible reservoirs upstream to be built in stages during the study period-- up to the year 2020. The report also lists seven alternative programs, which are combinations of various projects that could satisfy the needs of the entire metropolitan area (including parts of New Jersey and Connecticut). Only two of the Hudson River projects are included in the programs; however, the programs are only examples of how projects might be utilized.

Projects which make direct withdrawals from the Hudson River provide for the construction of reservoirs in upstate New York at various stages of the water resource development plans. The Joint Venture report has listed about 17 possible dam sites that might be developed for the

water supply projects. This section will examine some factors relevant to determining feasible alternatives for implementing the building of the dams and reservoirs; later sections will deal with the alternative projects.

Several issues relating to these sites may affect the type of organization that would carry out their development. For example, a number of them lie within the boundaries of the Adirondack State Park. The New York State Constitution provides that reservoirs for municipal water supply within the Adirondacks must be constructed, owned and operated by the state, and that these facilities may not take up more than 3 percent of the park land (Article 14, paragraph 2). Thus, if any reservoirs are to be built within the park, the state of New York-- presumably the Department of Environmental Conservation-- would automatically expand its role in the water supply development process. Although there is some disagreement, it is generally believed that 3 percent of the park lands will be sufficient for undertaking any of the projects.

Gooley Dam Site

Six of the alternative programs for regional water supply include the use of Gooley Dam for flow regulation of the Hudson River. It had previously been recommended as the most economical and favorable engineering alternative by the Water Resources Commission and by the New York State Department of Health in their studies following the 1960's drought. A history of the Gooley Dam controversy is important both as a case study and to show the kind of problems that might arise in trying to implement

any engineering project for water supply. The interaction of interest groups will be key in the choice of organizational alternatives for regional water supply.

Citizens in the area of the proposed dams and conservation groups organized a campaign to prevent the dams from being built. At a meeting in December 1968, the New York Conservation Council proposed that legislation to this effect be introduced. Senator Bernard Smith and Assemblyman Clarence Lane introduced a bill on February 4, 1969 (S. 2708 and A. 4944) designed to prohibit reservoirs for any purpose in a small portion of the Adirondack State Park-- on the "Upper Hudson River in the Adirondack park between Luzerne and the river's source; the Boreas River from its mouth to Durgin Brook; the Indian River from its mouth to Abanakee Dam; and the Cedar River from its mouth to Cedar River flow, by the state or by a river regulating board." The effect of the bill was to prohibit the building of Gooley Dam as then proposed. There followed a legislative public hearing in which strong opinions were expressed by conservationist interests. Former Commissioner of Conservation Kilborne, who was also a member of the Water Resources Commission, explained that the Department of Conservation would not take a position until the Temporary Study Commission on the Future of the Adirondacks had reported (December 1970). Nevertheless, the bill to protect that part of the Adirondack State Park was passed by a unanimous vote, and signed by the governor.

In 1970, the New York State Conference of Mayors introduced a bill that would have reversed the anti-Gooley Dam Law of 1969 by allowing dams on the upper Hudson if certain criteria were met. Assemblyman Clarence Lane amended the bill to reinstate the prohibition of dams on the rivers mentioned in the 1969 anti-Gooley Dam legislation, and added a section applying the criteria to the rest of New York State. Under the bill, the consent of the chairman of the Water Resources Commission was to be required for construction of dams anywhere in the state other than the prohibited area. The chairman could not give his consent unless the following criteria were met: (1) there was a public hearing; (2) there would be a water shortage for a substantial number of people in the foreseeable future, and the reservoir was designed to meet the water need; (3) the reservoir must include recreational purposes (boating and fishing); and (4) all the people of the state were to have access to the recreation facilities.

In the extensive public hearings, by far the greatest proportion of speakers were conservationists or people with vested interests in the property and communities to be affected by the dams. Donald A. Walsh, counsel for the New York State Conference of Mayors, and Nicholas A. Barbarossa, then assistant director, Division of Water Resources, Conservation Department, and Vincent G. Terenzio, deputy chief engineer, New York City Board of Water Supply, provided the major opposition to the bill as amended.

This bill (6355-A), proposed in the Assembly on March 19, 1970, passed with only one negative vote, but was vetoed by Governor Rockefeller on May 19, 1970. The governor explained that his action was based on the disapproval by the Conservation Department. Such a law would have put unreasonable constraints on the planning process. It also would have allowed for only two purposes in reservoirs anywhere in the state-- water supply and recreation-- and other potentially useful purposes of reservoirs would be precluded. Further, the governor maintained, the bill applied only to state agencies, even though it is normally the federal government, groups of municipalities or private interests who wish to build dams. Governor Rockefeller's explanation also mentioned that the Associated Industries of New York State, Inc., had disapproved of the bill. It appears that no attempt was made by the legislature to override the governor's veto, possibly because the vote was taken late in the session. Since then, no further action has been taken.

Interest Groups

Interests generally in New York State water supply politics appear to be relatively disorganized, although conservation groups have established a system of communication among themselves in recent years. Political visibility of water supply issues is low except in crisis situations. In relation to political activity around the anti-Gooley Dam controversy, pro-dam interests were not visibly very active, and various civic organizations did not participate. Finally, it appears that there

was a lack of constructive communication between the pro- and anti-dam groups.

The Gooley Dam water supply issue had low visibility, and did not attract New York City civic groups, which might have become involved in a political crisis, such as the Regional Plan Association, Chamber of Commerce, Citizens Budget Commission, Citizens Union, League of Women Voters, and the City Club of New York. A staff member of the Citizens Budget Commission, for example, said his group would become involved if a severe water shortage developed (as in the early 1960's when they were quite active), but otherwise the issue of water supply has low priority for such a small organization.

Industry played only a small part in the Gooley controversy. Finch Pruyn, a paper company-- much of whose forest land would be destroyed by the Gooley Dam construction-- acted to protect its interests through letters to representatives and meetings with influential people. As noted above, the Associated Industries of New York State, Inc., was the only group other than the Conservation Department mentioned in the governor's veto message of May 19, 1970. Associated Industries represents roughly half of the manufacturers in the state (about 1,800 firms are members). It includes industries with varied interests-- from forestry businesses which may be hurt by loss of land near a dam, to canning companies which use a great deal of water. Industries preferring or requiring regulated flows probably dominate in the membership. The Associated Industries does not seem to have been active during the 1969

bill prohibiting Gooley Dam's construction. Regarding the 1970 bill, however, they expressed their disapproval by letter to the governor as follows: (1) the bill would interfere with the planning process, (2) it might hurt the effort to abate pollution, since "settling basins or cooling ponds may be needed for the final solution to problems associated with control of environmental pollution," (3) there was insufficient time to study the bill to weigh its possible consequences, and (4) the bill's consequences for all types of industry in the state aroused concern.

Power companies-- particularly nuclear plants-- according to conservationists, need water even more than does New York City. They use it in quantity for cooling purposes, and therefore, could benefit from low flow augmentation. Nevertheless, they appear not to have been active in either the 1969 or the 1970 dam controversies.

Conservation interests are primarily project-oriented, so that those involved in the upstate dam controversy will be different from those concerned with Long Island water problems, or the expansion of the Delaware system.

There are numerous groups active in the protection of the Adirondacks. The primary source of their income is membership dues, and the staffs tend to be composed of voluntary workers. They hold meetings, disseminate information to members and attend public hearings. Among the major groups are the:

New York State Conservation Council
Association for the Protection of the Adirondacks
Sierra Club (Atlantic Chapter)

National Audubon Society
Adirondack Mountain Club
Adirondack Hudson River Association
Friends of the Forest Preserve
Forest Preserve Association of New York State
Adirondack Park Association
Isaak Walton League of America
Wilderness Society
Constitutional Council for the Forest Preserve

Local fish and game clubs, and garden clubs are also politically active in support of conservation.

There is good communication among the groups, partly because leaders have worked together on several issues and have become personal friends, and partly because there is overlap in the membership and leadership. The first major issue which brought the conservationists together was the Panther Dam controversy. Since then, their ties have strengthened.

The New York State Conservation Council is the largest and most powerful conservation group in the state with more than 350,000 members. It has a tradition of representing the fishing and hunting interests, but has been broadening its scope to include environmental protection in general. The council has organizations in every county, and communication with every state legislator. It has a close rapport with both sportsmen and conservationists who represent a large politically active bloc in the state.

The Legislative Committee of the New York State Conservation Council prepares a legislative report that is sent to all clubs, explaining each relevant bill, and following its progress through the legislature.

The Conservation Council has become the unofficial spokesman of conservationists because of its grass roots strength. The general feeling is that the conservationists are very strong in the state at the present time, and that this will probably not change in the near future. Some conservationists seem to believe that the state had been stalling examining alternatives to dams, expecting a water shortage that would permit reservoir plans to be carried out with less opposition. It appears that Adirondack-oriented conservationists would favor a Hudson River high flow skimming project as a positive alternative to the construction of upstream reservoirs as a solution to New York's water supply problem, even under crisis conditions.

A question arises as to why state representatives from New York City, Long Island and Westchester voted in 1969 and 1970 to prohibit dams in the Adirondacks when the water supply to be provided thereby would directly have benefited their districts. Many New Yorkers greatly value the existence of "wild" country and wish to preserve it; they are convinced there are, or soon will be, alternative sources of water that do not involve major reservoir construction. Some legislative representatives received a large volume of mail from their constituents supporting the bills. Furthermore, voting took place in a flurry of action at the end of the session, and some metropolitan area representatives apparently did not understand the bills. Also, several legislators felt they lacked adequate information for a decision and preferred to wait until the report of the Commission on Water Supply for Southeastern New York is published.

Leading Adirondack-oriented conservationists state that they understand New York City's need for new sources of water supply, but that the Adirondacks should be a last resort. Every other possible alternative, including desalination, recycling, ground water usage, cloud seeding, and improvements in management, should be thoroughly investigated. Also, New York City should take conservation measures before it pre-empts any more water from other areas of the state. It should repair leaks in distribution, meter its water, and have an increasing, instead of decreasing, scale of prices in relation to larger amounts of water bought. The Adirondack Park, a mountainous country of lakes and lush forests, is worth considerable amounts of money to preserve for the future.

On the other hand, proponents of Gooley Dam note that there will be a major deficit in water supply in the future, and a need to develop such sources for the increased demand. Dams are necessary for the proper management of a river, and Gooley Dam is the best engineering alternative and an economical way to supply water for southeastern New York. The dam might also enhance ecology and fishing opportunities by augmenting the low flow downstream.

Other Dam Sites Listed in the Engineering Report

The Gooley No. 2, Chain Lakes, and Cheney Pond sites, like Gooley No. 1, are within the area prohibited by the 1969 legislation; they can expect to run into similar opposition. The Big Shanty Mountain,

Piseco Lake, Shaker Mountain, and Wilcox Mountain sites also are within the Adirondack State Park.

One engineering alternative involves the expansion of Hinckley Reservoir. Such an expansion would probably necessitate the state's taking over the entire reservoir (construction, operation and maintenance), since the site is on the edge of the Adirondack State Park. The Hinckley Reservoir alternative would probably not affect irrigation, power or navigation in the area. While it is not now much used for boating, this use could be extended with the expansion of Hinckley, which now feeds the New York Barge Canal leading to the Mohawk River. In order to "keep the canal going," the reservoir is sometimes practically emptied, which has limited development around the lake. Thus, problems of relocation would be minimized, and expansion of Hinckley Reservoir would be beneficial for flow augmentation in the New York Barge Canal. While a larger dam would raise the water level and storage capacity of the reservoir, the results would be mixed. Aesthetic values might be reduced but the drawdown problems would presumably be lessened. Hinckley's present small annual flood control benefit would be lost. The project is unlikely to encounter much local opposition, since much of the surrounding land is state owned. An expanded Hinckley Reservoir would improve water quality along the badly polluted Mohawk River. The gain would doubtless be attractive to municipalities and industries, and would also benefit fish and wildlife and ecological values generally.

Dam sites that have been evaluated on generally small streams on the eastern side of the Hudson include the Dead Creek site, the Shushan site on the Batten Kill, Schaghticoke and North Petersburg sites on the Hoosic River, the East Nassau site, the Chatham site, and Ancram and Silvernails sites on the Jansen Kill. The Shushan site is likely to be strongly opposed because the Batten Kill is one of the best trout streams in the area. Potential reaction to other sites is not yet known.

Potential Schaghticoke Reservoir is on the Hoosic River. As in Hinckley, its use for water supply would eliminate its small flood control benefits. It would have no significant impact on irrigation, power or navigation, and other effects would be either mixed or positive. It is anticipated that certain species of fish would thrive in what would become, in effect, a large lake. At the same time, some losses to fish and wildlife can be expected because the character of the Hoosic River near its mouth would be changed. Mixed gains and losses are anticipated in terms of other ecological values. Considering its location near Albany and other heavily populated areas that do not have many lakes for recreation, multipurpose development of Schaghticoke would probably be welcomed by local groups, both as a desirable addition to landscape and as a recreation resource.

ALTERNATIVES FOR THE HUDSON RIVER

The Hudson alternatives generally can be divided into those providing for in-basin storage for flow regulation for withdrawal at Hyde Park; those that provide for inter-basin transfers for storage or

flow regulation; and floodskimming with provisions for early or later construction of reservoirs for flow regulation. Some of the projects would require international or interstate agreements. The following discussion focuses for illustrative purposes on some alternative projects listed in the engineering report.

Hudson In-Basin Storage Projects

One possibility which was included in six of the seven alternative engineering programs, provided for in-basin storage for flow regulations with water supply diversions at Hyde Park. This kind of project suggests such developments as the expansion of Hinckley Reservoir, and the construction of Gooley Dam No. 1 and Schaghticoke Reservoirs. The problems of developing the individual reservoirs have already been discussed. The project would automatically bring about a change in the present organizational process for water supply development-- the state would replace the local authorities as dam constructor and manager. A water resources official suggested that possible substitutions for the proposed dams could be a combination of Chain Lakes, Piseco and Shaker Mountain Reservoirs. Construction of Chain Lakes Dam has been prohibited by the 1969 legislation, but consideration of the feasibility of the other two sites will have to wait for further investigation.

Hudson Interbasin Projects

The project alternatives include use of Lake Ontario water for flow regulation. Removal of large amounts of water from one of the Great Lakes is not unprecedented. The city of Chicago has done so for many

years, not only for its domestic purposes, but also to augment the flow of the river systems in Illinois. When other states complained, the Supreme Court appointed a special master, who took testimony and recommended an allocation of water that was acceptable to all the states. Doubtless other states would be concerned about any substantial removal of water from any of the Great Lakes.

A further complication is that Lake Ontario forms part of the Canadian border. The draft Joint Venture report states that up to 1,000 mgd can be diverted to the Mohawk River through Oneida Lake without adversely affecting Oneida Lake or the New York Barge Canal. The engineering report also maintains that there would be insignificant effects on the hydroelectric power generation by New York State Power Authority and the Ontario Hydro at Massena and on the navigation requirements of the United States and Canada. The legal context permits state and Canadian authorities to contest the engineering report on these matters, however. Any proposal for the removal of water must be studied by the International Joint Commission which would make recommendations to the United States and Canada. It should be noted that the Canadian provinces have considerable power over water resources in their territory and would greatly influence any national government decision. Many other groups would also be interested, such as the Montreal Harbor Commission which is struggling to keep its harbor depth at 35 feet.

Similar procedures respecting international boundaries would arise in connection with projects that involve the use of Lake Champlain

water for low flow augmentation in the Hudson. Even though the United States government is in charge of federal waters, agreement between Vermont and New York and the federal government would be needed as a practical matter before water could be diverted. A number of objections can be expected from both sides of Lake Champlain. Developers and private owners would pose opposition, and in addition, there would be strong objection from every local government along the shore. Utilities, including proposed nuclear plants, also plan to use the water. Another complicating factor is that the water in the southern end of the lake is of poorer quality. This is a limiting factor although the use of the water would be for flow regulation rather than direct consumption. Project design can provide compensations for the water withdrawn from Lake Champlain, but not eliminate all change in the level of the lake.

Hudson Floodskimming Projects

Floodskimming the Hudson-- withdrawing water for nine or 10 months of the year during the higher flows-- is a major alternative for regional water supply. As incorporated in one illustrative program of the engineering study, the water would be withdrawn and treated at West Park. Its use during high flow months would permit the Delaware and Catskill Reservoirs to fill up and thus be prepared to meet the total requirements during the low flow months. Water supply for the New York metropolitan counties would enter the Delaware and Catskill Aqueducts at Shaft 4, and move through the existing aqueducts to Kensico. Water

for New Jersey would be conveyed from Shaft 4 to Great Notch by a seven-foot pipeline. When further facilities are required, additional flow would be carried through a second aqueduct built from Shaft 4 to Great Notch with a 14-foot branch under the Hudson from Spring Valley to Kensico to convey water to New York. Upland reservoirs could be built subsequently to provide uniform year round flows through the same facilities.

Field investigations have revealed four groups of unsettled issues respecting Hudson high flow skimming.

1. The quality of Hudson River water is regarded as poorer than that of the present system. Of course, treatment will raise its quality, at least in a technical sense, to as good or better than that of "clear mountain water," as presently found flowing to New York. New York City now plans to filter Croton water and it is believed likely that further treatment will be needed before very long.

Another objection bearing on water quality concerns the possible effects on the salt front of withdrawals during nine or 10 months of the year, which can on occasion be as high as 900 mgd. It is contended, though experts disagree, that the likelihood cannot be dismissed that the salt front might sometime move upriver to cause unacceptable salinity levels at Hyde Park.¹⁷ Available figures suggest that so far as the salt

17. The 1967 Comprehensive Public Water Supply Study for the City of New York and County of Westchester, by Metcalf & Eddy, Inc., Hazen & Sawyer, and Malcolm Pirnie Engineers, considered the impact on the salt front of a 12-month withdrawal and concluded the problem a real one. More study is needed to define the problem definitively and to consider its relevance to high flow skimming.

front alone is concerned there is considerable leeway for operating flood-skimming within safe limits, though experiment and further study may be needed.

2. New York-New Jersey Relationships. New York City and New York State officials are for the most part opposed to interdependence with New Jersey such as contemplated by parts of the floodskimming program, for example. New York City water supply officials are skeptical of any arrangements with New Jersey. They feel, from past experience, that agreements would have to be spelled out to the last letter, but that to do so would require knowledge of future events which is in fact impossible. These sentiments do not necessarily rule out arrangements between New York and New Jersey, but they imply residual uncertainties which would need to be clearly outweighed by other advantages or overcome after negotiation.

3. Disagreement With Engineering Conclusions. There is skepticism stated among some local officials as to whether the volume rate which the project requires can actually be conveyed from Shaft 4 through the existing aqueduct system. These officials are also concerned that this would intensify problems of repairing existing aqueducts. There is also difference of opinion among local officials about the advantages of timely construction of upstream reservoirs. Some feel that high flow skimming without them requires treatment and pumping at the point of withdrawal from the river that is inherently wasteful insofar as spring spilling may lose some treated portions. It would seem that good management could

minimize this sort of risk, but the economic cost of the risk should be included in evaluating the project.

4. Conservation Problems. A major concern is that a flood-skimming operation would take in large numbers of spawn and young fish. This issue, floodskimming shares (perhaps in less extreme form) with the other projects withdrawing water from the Hudson. The area above Newburgh or Poughkeepsie has virtually no salinity and is a favored breeding ground for shad, striped bass, sturgeon and herring. The critical time for spawn might be May and June; withdrawals would normally cease during the next several months. There appears to be agreement among some conservationists that the difficulty might be minimized by the proper location and structure of the intake apparatus further upriver.¹⁸ However, the very fact that the present rhythm of the salt front movement would be changed might increase ecological disturbances in the life of the river.

ALTERNATIVES FOR THE DELAWARE RIVER

The Board of Water Supply has seriously considered a project that calls for floodskimming the Beaver Kill Watershed, and diversion to the West Branch Aqueduct for storage in Cannonsville or Rondout Reservoirs (Project D-1). The state has not yet agreed to the plan. Communities in the area and the county itself would be hostile, and fish and game interests have strongly objected thereto.

¹⁸. Information of special pertinence is expected in the forthcoming committee report in connection with the Consolidated Edison proposals, and intake apparatus now installed at Tracey, California.

A second project contemplates that some of the releases required from Cannonsville Reservoir for flow control would be diverted to Kensico (with a possibility of transferring some of the water thus diverted to New Jersey), releases for flow control would be made from Tocks Island Reservoir (Project D-2), instead of Cannonsville. This would require an interstate agreement between New York State and New Jersey. New York would resist the interstate transmission of water partly because it does not wish to carry water for another state in its aqueducts. New Jersey's stated aim is to move away from reliance on central urban supply centers, such as Great Notch, where its portion of the water would be delivered.

New York City's use of Cannonsville Reservoir is restricted by the United States Supreme Court decree of 1954 regarding the Delaware River. On the completion of the construction of Cannonsville Reservoir, the city was to be permitted to divert up to 800 mgd from the Delaware. At the same time, the city was required to release enough water from Cannonsville to maintain a minimum flow of 1750 cfs on the Delaware River at Montague, New Jersey. Excess water in Cannonsville not used by New York City was required also to be released into the river. Both of the Delaware projects described above would probably require a reconsideration of this decree. This would entail obtaining Supreme Court action in the first instance or congressional action subject to Supreme Court review.

A brief history of the decision process for Cannonsville Reservoir follows to illustrate the legal and political components of the

present organizational structure. At issue was expansion of the Delaware system through the construction of Cannonsville Reservoir, or development of the Hudson River as a new source of supply.

Cannonsville Reservoir

In December 1949, after a very dry year, when innumerable water-saving plans were considered, New York City's Board of Water Supply submitted to the Board of Estimate a plan for building a "third stage" of the city's Delaware water project to provide an additional 900 mgd at a cost of \$140 million. The plan proposed the construction of a reservoir at Cannonsville, New York on the West Branch of the Delaware and a 44-mile long tunnel connecting it with the existing Rondout Reservoir. At the same time, the Board of Water Supply also submitted to the Board of Estimate a plan for tapping the Hudson River at Chelsea, New York, six miles north of Beacon, for an emergency 100 mgd. The Chelsea project would take about seven months to become operative from the date of approval, and it would cost about \$5 million.

The Chelsea plan was quickly approved, and the Board of Water Supply filed its plan with the New York State Water Power and Control Commission, which was responsible for allocating water sources at that time. The commission gave approval on condition that the city agree to (1) abandon the Hudson pumping plant and remove equipment by January 1, 1957, about a year after the portions of the Delaware River system then under construction would go into operation; (2) treat the water; and (3) avoid endangering the Poughkeepsie water supply system.

The Board of Estimate set the hearings for the Cannonsville project and approved the plan; the Board of Water Supply then filed its plan with the New York State Water and Power Control Commission.

About the same time, a similar plan for a Cannonsville Reservoir and connecting tunnel was presented to the governors of New Jersey, New York and Pennsylvania by the Interstate Commission on the Delaware River Basin (Incodel plan). The interim report issued on January 26, 1950 (Malcolm Pirnie Engineers, New York) claimed the plan would provide for the water needs of New York City until "beyond the year 2000" by developing an integrated water project in the Upper Delaware Basin. The Cannonsville Reservoir would be part of the first stage development of that plan. However, the very first step would be to establish a Delaware River Water Commission to plan, finance, construct and operate the proposed project-- as soon as the respective legislatures acted on the proposed plan.

The New York City Board of Water Supply had proposed to the Board of Estimate in December 1949 that its plan for Cannonsville Reservoir be offered to the agency created by the three states as an input to Incodel.

As the hearings on Cannonsville opened, it appeared that the strongest alternative to the Board of Water Supply plan was the "Beck plan" which called for a permanent tapping of the Hudson River near or south of Chelsea. It called for the construction of a barrier dam on the Hudson with a highway across it, necessary gates, navigation locks, and other facilities. The Citizens Budget Commission of New York joined in supporting this plan. It was introduced at the New York State Water Power

and Control Commission's hearings as part of the testimony, and was studied by the commission.

Objections to the Cannonsville Reservoir plan were voiced by local interests which would be affected, including milk producers, and by Delaware County officials who claimed that the dam would cause economic damage by taking away the best land and causing overcrowding of schools, housing shortages, and inflation of real estate values in adjoining areas.

Respecting the Beck plan, B. C. Nesin, director of the New York City Department of Water Supply, testified that Hudson River water would be hazardous to the public health. In the middle of July 1950, the New York City Board of Water Supply, in a report to Mayor O'Dwyer, rejected the Beck proposal as being impractical, and claimed that costs had been underestimated, that it would cause hundreds of millions of dollars of damage to existing shore developments, and would obstruct navigation.

The debate continued, and in November 1950, the state Water Power and Control Commission approved the Cannonsville Dam plan proposed by the Board of Water Supply. It was presented as the third stage of the \$440 million Delaware water system then under construction, it would take about 10 years to build and would satisfy the city's needs at least until 1980. It would impound approximately 97 billion gallons of water from the West Branch of the Delaware, but the United States Supreme Court would have to approve the diversions. In its decision the commission said that the quality of "raw water" in the Delaware water basin was superior to that of the Hudson River, applying the established sanitary rule of tapping

the purest possible water first. It also expressed the opinion that the Hudson project would be more expensive to construct than the Delaware West Branch system and costlier to operate and maintain.

In December 1950, the report of the special engineering panel on water supply retained by the Mayor's Committee on Management Survey was released. It declared that the use of the Hudson to supplement the city's existing water sources was preferable to the Cannonsville development of additional supply from upland waters. The water supply panel recommended that water be obtained at an intake just south of Hyde Park and pumped through a tunnel to connect with the existing Delaware Aqueduct. It would not require the construction of the barrier dam proposed in the Beck plan, but would require a filtration plant. The estimated construction cost was \$39,185,000 for 325 mgd of Hudson River water. The panel also recommended that further studies of the Hudson River plan be carried forward as soon as possible, noting that its study had been severely limited as to time and budget.

Arguing for the Hudson plan, the panel maintained that: (1) with modern methods of filtration, a supply of good water at lower cost could be obtained, (2) the Hudson could be developed without time-consuming court actions and interstate conflicts; (3) lower operating costs would benefit the city budget; (4) it could be operated more flexibly to conform with future water supply requirements; and (5) it conformed to the natural resources conservation guidelines.

At the same time, a report of the New York City Board of Water Supply strongly criticizing the Hudson plan was released. Arguing for the Cannonsville plan the Board of Water Supply maintained that. (1) it would be cheaper in the long run, (2) upland water was of better quality, (3) use of the Hudson would involve many intrastate difficulties; (4) Cannonsville water would have a gravity flow, while the Hudson River water would have to be pumped and "manufactured" thus involving annual appropriations, administrative decisions, labor troubles, personnel and maintenance problems, and (5) operating costs for the Hudson project would have to be met in the city's expense budget, while Cannonsville could be financed by borrowing outside the city's debt limit.

The New York City Mayor's Committee on Management Survey recommended that the city install metering, and take measures to stop the waste in its system before the development of any additional sources. The report also recommended that the city apply to the United States Supreme Court for permission to withdraw water from the Delaware River, and furthermore, that thorough studies be made of the Hudson River as a future water supply source. Finally, it recommended that studies be made for possible future treatment of water supply. Mayor Impellitteri referred to the Board of Water Supply the report and recommendations of the Mayor's Committee. The city immediately initiated proceedings before the Supreme Court to obtain permission to build Cannonsville in order to be able to withdraw water from the West Branch of the Delaware. No action was taken on major Hudson withdrawals.

As noted in a foregoing section, the United States Supreme Court in its decision on the New York City-Delaware water petition in June 1954, permitted diversion of 800 mgd. The actual construction of the project started in December 1955.

WATER FOR LONG ISLAND

The New York metropolitan area part of the NEWS study area includes Nassau and Suffolk Counties on Long Island. Population in Nassau County has more than doubled in the past two decades, rising from 672,800 in 1950 to 1.5 million estimated in 1970 by the Bi-County Regional Planning Board. The draft Joint Venture report projects further growth of half a million, to a total population of two million by 2020. Suffolk has also experienced rapid growth-- from 276,100 in 1950 to 1.1 million in 1970-- however, much of the county is still agricultural or undeveloped, leaving room for large population increases in the future.

Water consumption in Nassau is currently 152 mgd, of which about 69 mgd is returned to the ground. The safe yield is 159 mgd, and under present conditions, demand is expected to outrun supplies sometime between 1980 and 1990. Ground water available in Suffolk is estimated to be 513 mgd. Consumption is now 95 mgd and is expected to be no more than 335 mgd by 2020, so there would appear to be sufficient supplies for the bicounty area over the study period assuming substantial amounts are not exported to New York City. It should be noted, however, that local areas of Suffolk County, primarily the north and south forks on the eastern portion, will soon face inadequate supplies from local sources.

The state Division of Water Resources made predictions of levels of water use, and safe yield figures for Long Island up to the year 1990 which generally agree with those given in the draft Joint Venture report.¹⁹

Long Island's huge underground reservoir consists of three aquifers. They absorb water from precipitation, filter it through various sand strata and store it in a volume that is said to be something on the order of 60 trillion gallons. Of this, 10 to 20 trillion is estimated to be available for supply purposes. The reservoir is "like a bubble floating partly submerged upon a sea of salt water. If more water is taken out of the ground than is put in, the bubble shrinks and the surrounding salt water pushes farther inland, if water is added, the bubble expands."²⁰ In Kings and Queens Counties of New York City on the western end of the Island, excessive tapping of this reservoir over many decades has so shrunk the fresh water deposit in that part of the reservoir, that salt water has encroached upon the fresh water supply wells. In consequence, 83 percent of the water used in Kings and Queens now comes from the New York City water supply system.

Nassau County sewers lead out to the sea, with the result that much of the water that has been withdrawn from the aquifers is not returned to them. A pilot plant for treatment and recharge has been set up at Bay Park.

19. Long Island Water Resources, Division of Water Resources, New York State Conservation Department for the State Office of Planning Coordination (Albany, January 1970).

20. Ibid., p. 1.

The Joint Venture report's project alternatives call for a two-stage program tapping a 50-square mile area east of Lake Ronkonkoma in central Suffolk with a 28-mile transmission line terminating at Westbury in Nassau. This would yield 50 mgd. The second stage would involve enlarging the well field to yield 100 mgd to be transmitted to the Levittown area of Nassau.

A second alternative is similar to the first, but the yield is increased to 150 mgd. Initially the system would supply New York City, but later it would also make up for the deficiency in Nassau. The project would link Suffolk and Nassau to the New York City system with either a single or double main.

There is also a brief discussion of an exchange of water with the New York City system whereby Long Island would draw on New York City's system during wet years, allowing the aquifers to be replenished, Long Island and perhaps the city would draw on the full aquifers during dry years.

Development of well fields in Suffolk County would have little impact upon flood control, recreation, power, navigation or local development. However, if provisions are not made for adequate recharge or reuse of water, predicted withdrawals could result in lower water levels, causing aesthetic and/or ecological problems.

Chief among the effects would be a drastic reduction in the flow of fresh water in streams. This, in turn, may result in ecological changes affecting the marine and wildlife which populate the streams and shallow coastal bays.

If any significant changes of present water levels, stream flows and coastal ecology are subsequently found to be unacceptable, it will become necessary to treat all projected sewage treatment plant effluent to drinking water standards and recharge it back into the ground water reservoir and/or directly into the streams and bays.²¹

All projects that withdraw additional large amounts of water from the aquifers should consider these natural losses to the Island in planning for management of the system. In a recent hearing on the Holzmacher report for Suffolk County, a strong showing of conservationists led to the decision to study these ecological problems before acting on any plans for further development of the aquifers.

One engineering alternative proposes the export of some Suffolk water to New York City and later to Nassau. There has long been opposition in the county to supplying neighbors with water, partly because the county feels it may need the water itself. However, the additional revenue accruing to Suffolk County from the sale of water would be attractive and might be earmarked for recharge facilities needed to maintain the aquifer supply.²² (Interruptable purchase of New York City water, in exchange, might help recharge efforts too.) The state does have legal power to force cooperation should it decide to do so.

21. Holzmacher, McLendon & Murrell, Comprehensive Public Water Supply Study - Suffolk County, New York (Summary) (Melville, New York, 1970), p. 4.

22. When a 1966 Suffolk water bond issue failed, costs for recharge facilities were trimmed from the proposed capital budget, a consequently smaller bond bill was approved by the public in 1968.

Water Organization in Nassau County

Water supply in Nassau County is provided principally by seven private water companies which provide about 40 percent of the total, and by 39 municipal waterworks. The largest private company is the Long Island Water Corporation serving a population of roughly 260,000 in southwestern Nassau County.

Currently, the Nassau County government plays only a minor role in water supply. The Health Department monitors water quality, and the Department of Public Works is carrying out a tertiary treatment and recharge experiment at Bay Park on the South Shore. The costs of this process are not clear, but as of now they appear to be high.

Several bills have been introduced into the state legislature in recent years proposing the formation of a countywide water authority in Nassau, similar to that in Suffolk. Local Republicans are opposed to such an authority. In agreement with them are private water companies and water district officials. Organized opposition to an authority comes from the Long Island Water Conference (LIWC). This is a loose voluntary confederation of representatives of all of the public and private water companies in Nassau and Suffolk Counties. Representatives of other organizations having a particular interest in water supply and distribution also sit in on the regular monthly meetings; these include New York State Water Resources Commission (now part of the Department of Environmental Conservation), Department of Health, professional engineers and materials suppliers. The LIWC concerns itself with disseminating information to,

and solving problems for, its members. It has no staff but has plans for developing one. The current chairman is the chief engineer of the Long Island Water Corporation.

A study of alternative plans for water supply development in Nassau has been prepared by the engineering firms of Holzmacher, McLendon & Murrell, and Greeley & Hansen. It will be published shortly and is expected to shed some light on how the forthcoming water shortage might be handled. It suggests three alternative sources: Suffolk aquifers, New York City, and water reuse and recharge. It also will probably suggest options for countywide organization to improve management. Possible roles for the county include wholesaler of water to the present distributors, a supplemental role, or a retailer. The study has also considered the possibility of state management of withdrawals. The engineering firms were assisted by the Long Island Water Conference and other interested parties, and it is thought that most controversies were settled during the planning process.

Water Organization in Suffolk County

Suffolk County is served largely by private wells pumping water into pressurized storage tanks. There are about 100 separate water supply systems in Suffolk County. Of these, 60 percent are public and 40 percent are private.

About 60 percent of the public water supply system is controlled by the state created Suffolk County Water Authority; as of May 31, 1970, it was serving 650,000 people. (Water authorities have also been

established in several other New York counties.) The Suffolk County Water Authority obtains its funds only through revenue bonds. There is a proliferation of small isolated water systems in Suffolk-- often serving a development or a small cluster of houses in an isolated region. These companies are generally inefficient. When one becomes surrounded by territory served by the Suffolk County Water Authority, its customers find that the authority's rates are lower and the service of better quality. The water company-- which may have been intended as a temporary arrangement-- is normally willing to sell. The Suffolk County Water Authority has condemnation power; it has not used such power in recent years for taking over water companies, but has used it for developing new well sites. Any agency planning to develop water sources, must have the approval of the authority as well as the state water resources agency.

Suffolk has recently formed a new Department of Environmental Control encompassing principally the sewerage and water quality control functions. It is anticipated that the department will at some point take over water supply and the present responsibilities of the Suffolk County Water Authority. The Holzmacher report recommends "the consolidation of all private suppliers . . . plus the Water Authority into the water supply division of a County Department of Water Resources."²³

Holzmacher, McLendon & Murrell was asked by the state to consider the possibility of transporting water to Nassau County to relieve

23. Holzmacher, McLendon & Murrell, op. cit., p. 10.

the deficit there. Their findings are that Suffolk could export up to 120 mgd to Nassau until the year 2020 when the amount would be reduced to 80 mgd, or else Suffolk could supply 80 mgd up to and beyond 2020,²⁴ then Nassau would have to find another source. This is roughly compatible with the findings of the draft Joint Venture report.

Joint Nassau-Suffolk Action
for Water Supply Development

Although there has been no bicounty agreement on water resource management, the trend appears to be toward some form of cooperation in the long run. In 1965 the Nassau-Suffolk Regional Planning Board was formed. It is composed of three citizen members from each county, appointed by the respective county executives, the comptroller and public works commissioner of each county in an ex officio capacity, and advisory members including the county executives, and chairmen of the two county legislatures.

Since its creation, the primary efforts of the board and its staff have been directed toward preparation of a comprehensive plan for the future development of the bicounty region. The publication of the board's Comprehensive Plan Series, Utilities Inventory and Analysis, dealing with water supply states that

The management of the Region's water supply is essentially an engineering responsibility. It is difficult, however, to solve some of the water supply problems when there are over one hundred central suppliers and over one hundred thousand private wells. One public agency responsible for all of the water supply would alleviate problems of varying water costs, limited

24. Ibid., p. 9.

service, areas, and quality monitoring. . . . Careful coordination of water supply with land use planning will increase the overall efficiency of water resource management. A single public water agency will obviate duplication in pumping storage and distribution systems. Research, including new pumping techniques and purification methods, is best afforded by the single agency.²⁵

The comprehensive plan for 1985 recommends the formation of a public regional water authority to replace the 124 water companies now in operation. The authority should be responsible for supply, water quality, and research and planning.

Conclusions - Long Island

Although Suffolk County has enough water for local supply through the year 2020, the water supply demand of Nassau will reach the safe yield point sometime in the 1980's and a crisis will prevail unless steps are taken to develop recharge techniques, or to import supplies.

Suffolk County has been consolidating water suppliers, and plans recommend control of all supplies by a single line agency. Nassau County, on the other hand, has a multifarious group of public and private suppliers who have thus far worked together to prevent a large agency from taking over their business. The recommendations of the forthcoming comprehensive water supply study for Nassau County, in which the various water supply interests participated, should include organization and management changes for the county. Even with water source management improvements in Nassau, the county is expected to run a deficit of water

25. Nassau-Suffolk Regional Planning Board, Comprehensive Plan Series, Utilities Inventory and Analysis (1969), p. 20.

sometime before the end of the century. Any additional withdrawals from the aquifers will necessitate some program of water recharge or reuse if the counties wish to stop the erosion of the environment.

CONCLUSIONS - NEW YORK

In the New York State portion of the study area, water supply source development currently is the responsibility of local government. Major projects listed in the draft Joint Venture report call for withdrawal of water from the Hudson River at Hyde Park or West Park, and pumping and treatment facilities. A key distinction can be drawn between those projects requiring early construction of upstate reservoirs and floodskimming projects which do not require dam construction until after 2000. The present local organization is capable of building the intake at Hyde Park, the pumping station, and the distribution system, and could carry the cost of constructing the major dams. It is clear, however, that any project calling for upstate reservoirs would involve state action. Most of the major reservoir sites are located in the Adirondack State Park and the state constitution requires that reservoirs so located be constructed and operated by the state. This would probably be a responsibility of the Department of Environmental Conservation which is also concerned with water resources planning.

If the city were to select a floodskimming project the state role could be confined to its present functions until after the year 2000 when major dams would be required for flow augmentation, assuming that New Jersey does not raise questions of interstate allocation.

The state has been involved in water resource planning since the early 1960's. Its role is likely to become more important now that most types of plans have become the responsibility of a single agency. These plans have promoted a regional orientation to the water resources problem. The state does not appear to be interested in participating to any great extent in supplying water for southeastern New York. However, the state has been moving to take over urban functions-- as in the fields of housing and redevelopment, transportation, and parks and recreation, where local governments (including New York City) are unable or unwilling to act, and would probably move more vigorously on water for the New York metropolitan region if it saw a serious need for doing so. At the same time the state Department of Environmental Conservation is beginning to reformulate policy on water resources development, and part of its task will be the consideration of the needs for financial assistance to local governments for this purpose. The power of the governor over decision-making in this area is likely to be critical.

The federal government has played a minor role in solving the water supply problems of New York State in normal times. State officials concerned with water have shown an interest in federal aid, but fear of federal control.

A problem with the present system stems from dissatisfaction of the suburban counties that are served by the city system. With growth rates projected for the next few decades, their demand for water may increase substantially. While technically, New York City could continue to

service them as it presently does, changes in the service arrangements or even organizational arrangements may take place during the city's struggle to find political support for its future water supply development. If New York City seeks cooperation of these counties in an effort to expand its water sources, the counties can in turn extract concessions from the city. The feeling was expressed in Westchester that, if the county will have to participate in carrying bonds for a larger water supply system, it would also want to be represented in the decision-making body-- implying a possible justification for a bicounty or regional system. On the other hand, New York City did finance and build the existing system and can be expected to protect its interests. Furthermore, any new development for many reasons would have to be integrated with the existing system.

There have been proposals made in the city for reorganization of the water supply administration. Currently, an independent utility for water supply and sewerage is being considered by some city officials. However, the Board of Water Supply was created by the state and state legislation will be necessary for any reorganization.

While the water supply issue at present has low political visibility, as the demand overtakes present sources, there is certain to be more political and citizen interest. It appears that most upstate conservation groups, sports clubs, gun clubs, and garden clubs would probably support Hudson floodskimming because it does not pose the need for reservoirs until around 2020. Hudson River-based conservation groups will probably oppose any disturbances to the Hudson River. At the same time,

the Conference of Mayors, the New York City water supply system, and industry will probably support the direct withdrawal projects which require early construction of reservoirs. In order to obtain the necessary support for expanding its system, it is likely that New York City will have to make some concessions both to the suburban counties to which it now supplies water and to the state.

If the current opposition to building upstate dams prevents construction, the city might build the floodskimming project as a first stage in water supply development to see what its effects would be. If this project proves inadequate, then efforts would be made to speed up the construction of the reservoirs proposed for the year 2020.

Two major unknowns leave New York's water problems in an uncertain state. First, the newly created Department of Environmental Conservation has yet to reveal its stand on major water issues, the department's actions, with the support of the governor, could be decisive. Second, the state commission reports and official reaction to them will bear directly on water resource development in New York.

C h a p t e r 2

WATER SUPPLY FOR SOUTHWESTERN CONNECTICUT

INTRODUCTION

The state of Connecticut is involved in both the southwestern New England and the New York metropolitan study areas of the NEWS study. In the former, possible developments of the Connecticut River in Massachusetts and the Moosup River in Rhode Island have implications for water resource use in Connecticut. These implications are discussed in the chapters on Massachusetts and Rhode Island. This chapter deals primarily with issues of water supply development in Connecticut relevant to the NEWS New York metropolitan study area.

The New York metropolitan study area-- i.e., the area to which water is to be supplied-- includes three Connecticut counties: Fairfield, New Haven and a large portion of Middlesex. These three counties had an estimated 1965 population of 1,522,000 representing about 8 percent of the study area population, and close to 50 percent of the state population. They cover a total of 1,484 square miles representing 16 percent of the New York metropolitan study area and 30 percent of Connecticut's land area.

The Joint Venture draft report determined that Middlesex County could be supplied indefinitely through the augmentation of existing systems and development of the Connecticut River which bisects it. New Haven and Fairfield Counties have undergone rapid population and industrial growth

in the past 25 years and have developed into predominantly urbanized areas, with population densities averaging 1,150 and 1,880 persons per square mile respectively. The NEWS engineering study lists two main approaches to meeting upcoming water deficits in these two counties. (1) interstate transfers from the Delaware River in New Jersey or the Hudson River in New York, or (2) in-state development of the Housatonic or Connecticut Rivers. The in-state projects in the six regional alternatives outlined in the Joint Venture report include a 40 mgd diversion from the Housatonic River to the reservoir at Trap Falls, a larger development of the upper Housatonic, and a 90 mgd development of the Connecticut River.

Connecticut is also considered as a possible supply area from which to draw water for interstate transfers to New York and New Jersey. Numerous possibilities are considered for development of the Housatonic and Connecticut Rivers for exportation. The only one illustrated in the six regional alternatives is the development of some 750 mgd of the Housatonic, employing Lake Candlewood, to supply New York.

ORGANIZATION FOR WATER SUPPLY

Water supply development in Connecticut traditionally has been a local responsibility assumed by towns or private companies. Until recently, state government involvement has been limited to granting water rights and regulating supplies and facilities for health and safety factors. Current trends are toward a greater regional orientation to water supply development and a stronger role for the state government in

planning for and regulation of the state's water resources, including water supply.

Of the 169 towns in Connecticut, 130 are served by a total of 332 public systems which are municipally, regionally, or privately owned and operated. In 1967, about 2,417,000 people or about 83 percent of the estimated state population were served by these systems,¹ ranging in size from the Valley Water Company, serving some 81 people, to the Metropolitan District Commission (Hartford), serving an estimated 374,000 in 1960.²

Private water companies are unusually important in Connecticut, numbering 283 or 83 percent of total public systems and serving about 52 percent of the population supplied by public systems.³ In the NEWS study area, private water companies serve several regions. The Bridgeport Hydraulic Company serves seven towns in the Bridgeport area with an estimated 1960 population of 305,000.⁴ The New Haven Water Company serves 12 towns with an estimated 1960 population of 310,000.⁵ The Connecticut Water Company serves eight towns with a 1965 population of 96,000.⁶ The

1. Public Water Supply Information, Connecticut State Department of Health (Hartford, Connecticut), p. 1.

2. Analyses of Connecticut Public Water Supplies, Sixth Edition, Connecticut State Department of Health (Hartford, Connecticut).

3. Ibid., p. 1.

4. Those seven towns include Bridgeport, Easton, Fairfield, Shelton, Stratford, Trumbull and Westport.

5. Those 12 towns include New Haven, Bethany, Branford, Cheshire, East Haven, Hamden, Milford, North Branford, North Haven and Woodbridge.

6. Directory of Water Utilities in Connecticut and Rhode Island (Plainfield, New Jersey Public Service Research), prepared for the U. S. Department of the Army, Corps of Engineers, North Atlantic Division, Contract No. DACW 52-68-147, September 1968, p. 7.

Stamford Water Company serves Stamford and Darien with an estimated 1960 population of 74,000. And the Greenwich Water Company serves Greenwich, Connecticut and Port Chester, New York with a combined 1960 population of about 50,000.

Two public regional systems in the state are the Metropolitan District Commission (MDC) and the Southeastern Connecticut Water Authority. The MDC is a metropolitan government serving some 374,000 people in the Hartford area with water and sewerage although it has the power to provide a range of services, including street maintenance, collection and disposal of garbage and refuse, and regional planning. The Southeastern Connecticut Water Authority was created in 1967 at the innovation of towns in the area-- primarily New London and Groton-- to provide the single service of water supply.

Responsibility for water supply at the state level currently rests in four agencies: the Department of Health, the Water Resources Commission, the Public Utilities Commission and the Office of State Planning.

State Department of Health

The Health Department is the most important state agency in water supply. By statute, the department has "jurisdiction over all matters concerning the purity of any source of water or ice supply used by any municipality, public institution or water or ice company for obtaining water or ice."⁷ The law continued: "The qualifications of the operators of plants

7. Connecticut General Statutes, §§25 and 32.

for the treatment of water furnished or intended to be furnished to any such water supply shall be subject to the approval of said department."

Section 25-33 states:

Each person, firm or corporation supplying water to the public shall, on request, furnish the state department of health with all reasonable information regarding its water works and the source from which its supply of water is derived. No system of water supply owned or used by such municipal or private corporation or individual shall be constructed until the plans there-fore have been submitted to and approved by said department.

In practice, the department exercises the full complement of its statutory power. The Water Supply Section of the department's Division of Environmental Health is the full time supervisor of the state's numerous water supply systems, both public and private. Responsibility for the safety of supplies has carried the department into broad regulatory activity. It interprets this responsibility to include "a continuing assessment of public water supply yields and demands. Projections of future demand and studies of available future water sources are made in conjunction with the department's responsibilities for assuming safety of public water sources."⁸

The department traditionally has supported water companies in their efforts to keep their water supply reservoirs free from recreational activities which are potentially polluting. It continues to oppose use of reservoirs for contact sports and maintains that authority to determine

8. Meeting Connecticut's Water Supply Needs, Connecticut State Department of Health (February 1967), p. 500; reprinted from the Connecticut Health Bulletin, 81 (January 1967).

the recreational use of reservoirs should remain with the companies themselves. Richard S. Woodhull, chief of the Water Supply Section has written

. . . that in so doing control has remained with those in the best position to judge the effect of these recreational activities and the power has been retained to curtail or withdraw permits as the occasion demanded. No other body could have the necessary practical working knowledge, born of responsibility, that accrues to the water purveyor. He is responsible for the quality of the water he sells and must be allowed to make the judgment as to the use of land he has found it necessary to control to protect that quality.⁹

In addition to the department's activities to assure sufficient quantities of water for supply and adequate quality for both drinking and bathing, it also has been involved more broadly in pollution control, including

1. Watersheds inspection program.
2. Sanitary surveys of streams.
3. Sewage plant effluent and stream sampling program.
4. Inspection and guidance of operation of pollution abatement facilities.
5. Solid waste disposal program for disposal of garbage, rubbish and industrial residues without pollution of surface ground waters.
6. Sanitary surveys and float studies of currents' and tides' effects on shellfish harvesting areas.

9. Richard C. Woodhull, P. E., Let's Save Our Reservoirs, Connecticut State Department of Health (May 1965), p. 22; reprinted from the Connecticut Health Bulletin, vol. 79, no. 4 (April 1965).

7. Studies on subsurface disposal of sewage from public buildings, schools, factories and commercial properties and private dwellings.¹⁰

Before the state Water Commission-- forerunner of the present Water Resources Commission-- was created in 1925, the Department of Health was the sole state agency responsible for water pollution control.

When the legislature created the Water Commission it did not repeal the Health Department's statutory power in pollution control. When the Water Resources Commission was created in 1957 it assumed the functions of the Water Commission. Until passage of the Clean Waters Act of 1967 there was considerable overlap in pollution control between the Department of Health and the Water Resources Commission. This act gave the commission all functions having to do with the protection, management and development of water resources except those dealing specifically with health.

Water Resources Commission

The commission was created in 1957 to replace the state Water Commission, the Flood Control and Water Policy Commission and the state Board of Supervision of Dams, Dikes and Reservoirs. It is comprised of seven members including a representative of the Department of Health and the following interests: agriculture; fish, wildlife and recreation, manufacturing, electric and water utilities, municipalities; and the public at large. Members are appointed to four-year terms by the governor with the advice and consent of the Senate.

10. Connecticut General Statutes (Rev. 1958) §25-1.

The commission's primary area of concern is water pollution abatement for which the Clean Water Act of 1967 provided broad powers.¹¹ As noted above, this function overlaps with the water pollution control activities of the Department of Health. However, the two agencies agree that they have established a working arrangement which is complementary rather than duplicative. The Department of Health focuses its efforts on pollution abatement directly affecting water supply or bathing, whereas the commission is concerned with water quality in general. Consequently, the commission's entry into the water supply area via pollution control is limited.

A more direct water supply responsibility of the commission is interstate negotiation of water transfers.¹² The commission is authorized to enter into agreements with other states or federal agencies respecting the use of interstate waters and organizations or compacts

11. See Connecticut's Clean Water Act of 1967: An Analysis of Public Act 57, published by the Clean Water Task Force (Hartford, Connecticut, July 1967).

12. The Water Resources Commission is authorized, as the representative of the state of Connecticut, to negotiate, cooperate and enter into agreements or compacts with authorized agencies representing any one or more states or commonwealths, or the United States, or any combination thereof, relative to flood control, river and harbor improvements or obstructions, navigation, pollution of interstate waters, diversion of interstate waters and the use of such interstate waters by any agency of the United States, or any one or more states or commonwealths, which will tend to increase the hazard of damage to persons or property located or situated in this state by reason of flood waters or which will in any way interfere adversely with the navigability of any stream or river located wholly or partially within this state during period of low flow in the mainstream or any of its tributaries. Connecticut General Statutes (Rev. 1958) §25-3.

therefore, subject to the approval of the governor and ratification by the General Assembly.¹³

Finally, the commission must approve the sale of "surplus" water (amounts exceeding a system's safe supply) by any public water system including private companies (which must also win approval of the Public Utilities Commission).

Public Utilities Commission

Private water companies in Connecticut are by statute public service companies, and as such are regulated by the Public Utilities Commission.¹⁴ The commission's regulation relates primarily to the business operation and rate schedules of the companies with little or no attention to planning.

Office of State Planning

A long-term, multipurpose water resources planning study currently is being coordinated by the Office of State Planning, Department of Finance and Control. In 1967, the General Assembly passed Public Act 477, providing \$1,500,000 in bond money, and directing the Water Resources Commission, the Department of Health, the Board of Fisheries and Game, and the Connecticut Development Commission "to prepare jointly a statewide

13. In 1965 an Interstate Water Compact Commission was established to advise and assist the governor in entering into compacts with other states for the purpose of collecting, transporting and distributing water for use by Connecticut municipalities. The commission is composed of 10 members, four appointed by the governor, three by the president of the Senate, and three by the speaker of the House (§25-122-24).

14. The commission is comprised of three members appointed by the governor with the consent of the Senate (§16-2).

long-range plan for the management of the water resources of the state and to aid in the preparation of regional sewer and water facilities plans."¹⁵ In 1969 the act was amended to transfer the coordinating function originally assigned the Connecticut Development Commission to the Office of State Planning. As project coordinator, the office (1) is the contracting agency for the purposes of the act, (2) is responsible for engaging consultants or arranging for the technical assistance to implement the work program; (3) makes grants to regional planning agencies for the purposes of preparing regional plans for sewer and water facilities; (4) acts as secretariat to the Interagency Water Resources Planning Board (IWRPB); and (5) coordinates staff technical work.¹⁶

The IWRPB, the study's policy-making body, is comprised of the following members: director, Water Resources Commission; director, Environmental Health Services Division, Department of Health, director, Board of Fisheries and Game; director, Office of State Planning; and a representative of the Department of Agriculture and Natural Resources. A technical board also was formed, consisting of one staff member from each of the above mentioned agencies to assist the IWRPB.

The legislature charged the agencies specifically to (1) design a unified planning program and budget, and (2) coordinate regional sewer

15. A Status Report and Description of Comprehensive Long Range Water Resources Planning in Connecticut, for the Connecticut Water Resources Planning Project by the Office of State Planning, Department of Finance and Control (April 21, 1970), p. 1.

16. Ibid., p. 1.

and water facilities plans and provide technical or financial assistance to regional planning agencies in the preparation of regional water and sewer facilities plans which are necessary as guidelines for the planning and designing of local and interlocal facilities and which are required by the federal government as a prerequisite for grants to municipalities for the construction of certain sewer and water facilities.¹⁷

The board decided to carry out this work through development and use of its own staff rather than by contract with consultants. It was felt that this would increase in-house staff capabilities of the various agencies to facilitate effective implementation of the plan and allow for ongoing water resources planning in the future. A qualified water resource management person was appointed in the summer of 1970 as executive secretary of the IWRPB and now works in the Office of State Planning.

Despite its delay in beginning and problems with manpower shortages, the board was able to cite the following achievements by spring 1970:

1. Undertook a statewide inventory of the recreational, water supply, sewerage, and flood control facilities, uses and needs relating to Connecticut water resources.
2. Prepared work maps, charts and graphs related thereto.
3. Inventoried and prepared files and listings of water resources planning materials and documents.
4. Evaluated the water supply and sewer requirements of the four alternative planning concepts for future land use development in Connecticut which were prepared by the Connecticut Interregional Planning Program.

17. Ibid., p. 1.

5. Evaluated and reviewed Regional Planning Board recommendations to determine interregional and statewide implications.

All of the 13 regional planning agencies in the state have been granted state and local funds-- under the direction of the Office of State Planning-- to undertake regional water and sewer planning studies. Five of the regions had completed their studies by November 1970, and another five were expected to be completed within a year. These studies, most of which were undertaken by consultants, are expected after extensive review to provide detailed, yet comprehensive, inputs into the state multipurpose plan.¹⁸

At the state level, planning has proceeded to the point where clear choices can begin to be seen for competing demands in specific resource areas. For example, estimates of water needs for water supply and recreation are being mapped for specific service areas to determine what the trade-offs are between the two and whether the selection of one purpose at the expense of the other can be avoided by utilization of resources from other areas.

Governor's Committee on Environmental Policy

At the beginning of 1970, the governor appointed a Committee on Environmental Policy of over 150 citizens "to develop a comprehensive environmental policy for Connecticut." The committee submitted its report in

18. Many of the local governments whose regions have completed their studies, having met the federal regional planning requirement, have received sizable federal grants for water and sewer facilities.

June 1970, recommending a broad policy approach to environmental problems under the direction of a Council on Environmental Quality. Most of the committee's specifically water supply-related recommendations concerned pollution abatement for the protection of supply sources. The report added force to the growing concern in Connecticut for comprehensive management of the state's resources, including its water resources.¹⁹

The Context of Reorganization

Little activity is found in water supply at the state level. However, it is worth noting the current trends in state politics which could affect the outcome of important water issues.

In the past decades the executive branch of government in Connecticut has overshadowed the legislature. The key to political power in the state has been the tight discipline of both parties under the strict

19. An Environmental Policy for Connecticut. Report of the Governor's Committee on Environmental Policy (New Haven, Connecticut, June 1970), pp. 34-41. Among the committee's 60 recommendations were the following which relate to water supply development: the General Assembly should create a governor-appointed Council on Environmental Quality which would report annually on the environmental conditions of the state, the trends in the quality, management and use of the environment, and the implications for state policy; review public and private activities that might affect the environment, and make recommendations to the legislature for improvements in programs and activities; an assistant attorney general should be assigned to the Health Department as a liaison with other agencies and to encourage enforcement of standards; the Office of State Planning and the State Planning Council should draw up a plan for economic growth and an improved environment; areas of special value (floodplains, potential water supply sources, scenic and recreation areas, and conservation areas, etc.), should be identified; reservoir sites should be acquired in the process of long-range planning, and minimum stream flows, and thermal pollution standards should be established.

control of the party leadership. While these conditions continue into the present, in recent years the legislature has taken steps to increase its power vis-a-vis the governor and state administrative agencies, simultaneously the traditional role of the party leader has been challenged. A recent study by the Eagleton Institute found that a representative sample of legislators and members of the League of Women Voters both gave the General Assembly low marks on legislative performance.

The apportionment of legislative districts also has played a role in molding the character of the legislature. Under the old system, 10 percent of the state's population could elect a majority of the House and one-third of the population could elect a majority of the Senate. However, the districts in both Houses have since been reapportioned to reflect the Supreme Court's "one-man, one-vote" ruling.

Two additional factors which have worked in concert to limit the power of the legislature have been the biennial legislative sessions and the almost complete absence of professional staffing. Each of these factors alone could prove to be crippling. Together they effectively prevented the legislature from keeping well enough informed to have a serious impact on state policy. Action has been taken to change both of these conditions. The Eagleton study in itself was an indication by the legislature that significant inputs of professional help were needed and desired. The main thrust of the Eagleton report was that in order to become an effective body, the legislature must develop sources and systems of

information equal to and independent of the executive branch. The legislature appears inclined to pursue this recommendation.

Even more dramatic has been the determination of the legislature to establish annual sessions of the General Assembly and to achieve other reforms. The 1969 legislature approved a constitutional amendment to that effect, only to have it vetoed by the governor. In an unprecedented show of unity, both parties in both houses of the General Assembly unanimously overruled the governor's veto. The amendment was placed on the fall 1970 ballot and approved by a wide margin.

The public has generally not taken much interest in state politics. This has applied as much to gubernatorial as to legislative activity. On the one hand, town government traditionally has provided the primary services, including water supply. Although this is typical of most states, it is accentuated in Connecticut with its New England tradition of the town meeting. Town and city governments were strengthened by abolition of county government in the 1950's. On the other hand, the southwestern part of the state tends to gravitate more toward New York City than to Hartford. Many of Fairfield County's residents work in New York City and live in areas which developed largely as suburban New York communities. Many of the families in the area are newcomers to the state; they and longer term residents generally have been indifferent toward the government in Hartford over which they have little power, and which, in fact, seems to affect them insignificantly one way or the other. This New York orientation, and the degree to which it is likely to change, is

of particular interest to the NEWS study insofar as the southwestern part of Connecticut is considered a functional part of the New York metropolitan area.

For the purposes of the NEWS study: (1) the type of decision which will have to be made respecting future water supply development in Connecticut will be heavily and possibly decisively influenced by state decision-makers, and (2) the delineation of political power in the state-- and hence how and by whom those decisions will be made-- may be shifting. Traditionally, the governor and his party's state chairman have enjoyed wide latitude in deciding important state issues. However, as the legislature continues to assert itself, the process of decision-making will likely become increasingly complex and influenced by the strength of local forces represented in the legislature. This trend is likely to be reinforced by the results of the 1970 election which left the state house in Republican hands but the legislature under Democratic control. In such a situation, compromise tends to become more necessary and decisive action on such controversial issues as large water supply development is more difficult.

There appears to be little enthusiasm in Connecticut for the exportation of water to New York or New Jersey. A stronger legislature, sensitive to local opposition to major Housatonic developments, would probably make such diversions unlikely under state auspices. The most vocal opposition to Housatonic/New York diversions will come from those people in the Housatonic Valley who would be directly affected by a major

water supply development. The legislature offers this group its most likely forum for effective obstruction. With the possible exception of legislators from the Southwest who may feel that an interstate agreement to supply areas of Fairfield County with water from New York's Kensico Reservoir may be desirable, most legislators have no reason to support the exportation of Connecticut water. Therefore, it is likely that the legislature as a whole would tend to oppose the upper Housatonic projects.

Unless water is in critical shortage-- which in Connecticut it is not-- water users tend to be unconcerned about their water department's search for new sources. On the other hand, residents whose homes are threatened with inundation, or sportsmen and conservationists whose favorite natural areas are threatened with destruction do indeed care and increasingly are willing and able to fight the issue. Again, a heated minority opposition is more likely to be effective in the legislature where important local interests are enthusiastically represented than it is in the executive branch which is more sensitive to statewide interests.

Legal, Organizational and Nonmonetary Factors
Associated With Illustrative Regional Project Alternatives

Lower Housatonic Diversion to Trap Falls

In this project Lake Housatonic above the Shelton Tidal Dam could be used to supply 40 mgd to meet regional needs in southwestern Connecticut. The project would support the yields of the New Haven Water Company and the Bridgeport Hydraulic Company systems.

The water would be treated at the intake of Lake Housatonic or in combination with the existing upland supply at Trap Falls Reservoir, five miles west. The project would depend upon the

run of the river at Shelton, except when the daily releases from upstream power reservoirs were insufficient to meet water supply and industrial needs at Shelton. At such times, the power company would be compensated for additional releases from storage. Natural flows at Stevenson Dam during the 1962-1966 drought averaged less than 310 mgd. No provisions are made in this project for increasing flows below Shelton Dam.

About 25 of the total 40 mgd would be used by the Bridgeport Hydraulic system, of which the Trap Falls Reservoir is a part, the remaining 15 mgd would flow into the New Haven system. The water used by Bridgeport would not be totally removed from the system since that city discharges its treated sewage back into the Housatonic. However, diversions to the New Haven water system eventually would be discharged directly into Long Island Sound as waste, and therefore, would be totally lost to the Housatonic system. This net output from the Housatonic Basin, 15 mgd, accounts for less than 5 percent of the low flow in drought years (310 mgd), so the impact upon other uses is expected to be negligible.

Adverse impact upon water quality would not appear to be significant. Similarly, while some damage might be done to the ecology, and fish and wildlife, the negative effect has not been considered potentially great. Some occasional disturbances of the existing power system might be experienced because demands for both power and water (for household use) could periodically rise simultaneously.

Some objections might be registered against the exportation of 15 mgd to New Haven, but objections would be minimal because water would be transported in a deep tunnel, much of which has been constructed and is in use now. Overall, since the project serves regional intrastate

supply needs and has only minor adverse impacts upon other uses, little resistance to it would be expected.

The program of Bridgeport Hydraulic is designed to provide for the needs of its present area of responsibility to 2020 as well as to wholesale enough water to serve the needs of the Norwalk, Stamford, and Greenwich Water Companies to the southwest and to Ansonia, Derby, Seymour and Naugatuck to the north, a total of approximately 400 mgd. Thus, the company poses itself as a major alternative for regional institutional arrangement.

Upper Housatonic Development
for Southwestern Connecticut

Water would be withdrawn from Lake Housatonic above the Shelton Dam and below the hydroelectric station at Stevenson. A purification plant would be located at Shelton and distribution would extend into New Haven and Fairfield Counties. A pumped storage reservoir upstream of Lake Lillinonah, Robbins No. 2, an 82-billion gallon basin with flow line 90 feet above the hydroelectric pond on the Housatonic River near Falls Village, Connecticut, would develop up to 320 mgd.

Development of this project would increase low flows and reduce high flows, but not enough to have a significant impact upon flood control requirements. Nor would water quality be greatly improved by the addition of water from Robbins to the stream because from that point to Shelton Dam the quality is already satisfactory. If any perceptible change occurs, however, it would likely be a benefit. The increased flow in the Housatonic could produce benefits with respect to recreation, the environmental quality of the area around the river, and fish and wildlife. At the same

time, a slight benefit is possible for power generation in the immediate area.

At Robbins Reservoir, on the other hand, there are likely to be problems with fish management and maintaining recreation resources because of the fluctuation of the water level. Construction of the reservoir may disrupt the ecology at the site, and difficulties will certainly be encountered because of the necessity of relocating a highway and a railroad and an unknown number of structures.

Any reservoir construction plan in the Housatonic Valley would confront intense resistance from local residents, vacation homeowners (including New Yorkers) and conservationists. Nevertheless, this project could produce several benefits in addition to water supply.

Upper Housatonic Development
For Connecticut and New York

Water supply storage for this project would be obtained in the two largest hydroelectric reservoirs on the Housatonic as well as upstream reservoirs. The 16.8-billion gallon storage in the top 10 feet of Candlewood Lake needed for water supply in droughts would be refilled by floodskimming from the Housatonic as needed to supplement the natural runoff from the 40-square mile drainage area. Daily releases, as required for water supply, would be regulated to provide peak power output at Rocky River and Lillinonah.

Lake Lillinonah is a 47,000 KW run of the river development. The pond is used for recreation and the water level is presently held within a range of a few feet. This project would utilize the 19 billion gallons stored in the top 50 feet of the reservoir. Lake Lillinonah has fewer

residents along its shoreline than Candlewood and would normally be drawn down first.

In addition to Robbins No. 2, Konkapot No. 2, a 41-billion gallon reservoir with flow line 82 feet above the mainstream of the river near Housatonic, Massachusetts, would be developed for pumped storage in this project.

The intake and treatment plant would be located at Candlewood Lake, and treated water would be transmitted to Kensico Reservoir in Westchester County, New York, via a 28-mile tunnel. The project would include a pumping station and force main to transfer water from Lillinonah into Candlewood.

This project would have no significant impact upon irrigation or navigation in the area. Although the Housatonic Valley is plagued with serious flooding problems, once the reservoirs are filled no additional flood control benefits could be realized.

The impact upon water quality and recreation is mixed: above Candlewood Lake, water from the two reservoirs would augment the present flow with resultant benefits; below the lake, water quality and recreational benefits would be reduced. Lake Lillinonah is presently extensively used for recreational purposes, but these benefits would be significantly reduced because of the fluctuation in the water level. Recreational possibilities with respect to the two new pumped storage reservoirs are limited, as noted above in the discussion of Robbins No. 2.

Lake Candlewood is one of the prime recreation spots in western Connecticut. Indeed, it provides a key resort spot for thousands of New York metropolitan area residents. Many of the homes along the shores of the lake are owned by New York residents, and the Squantz State Park bordering the western part of the lake is visited by thousands of non-Connecticut residents each year.

The use of Lillinonah and Candlewood water for water supply could be achieved at the expense of present power developments there; while daily releases would presumably be regulated in such a way as to supply peak power output needs, full satisfaction cannot be guaranteed.

Adverse consequences would arise from both the reservoirs upstream, which would be built at the expense of sacrificing natural streams and wetlands, and from the reduced flow (and poorer quality) of water at the Housatonic estuary. There are vast shellfish areas-- chiefly oyster seedbeds-- at the estuary now, and some have already been closed because of pollution. Upstream prime trout streams would be threatened by reservoir construction.

Local and statewide interest groups will raise vocal opposition to the loss of natural streams, or the significant alteration of popular lakes. Joining them will be property owners at the reservoir sites and homeowners on the shores of Candlewood Lake, whose property values would be adversely affected by the fluctuations in water level, or whose land would be inundated.

In addition to these protests against environmental losses, few political leaders would appear willing to accept the liability incurred by supporting the taking of water by New York from Candlewood Lake before all possible New York sources (notably the Hudson River) are exhausted. The exportation of any water from Connecticut to New York State will provoke outcries. Connecticut officials believe that water supply needs should be met from intrastate sources; to the extent that that conviction is reflected in policy, little willingness to consider water transfers either into or out of Kensico Reservoir can be expected.

Connecticut River Diversion for New Haven

The federal Water Quality Administration has stipulated that any diversions from the Connecticut River shall be arranged to assure in 2020 an average flow of not less than 4,053 cfs, ranging from 2,905 to 5,444 cfs, through the year in the river below Middletown, Connecticut. Flows of this order would keep the salt water front fairly close to the mouth and facilitate withdrawals at Middletown or Hartford.

This project would deliver 90 mgd through a pipeline from the Connecticut River at Middletown to New Haven, following treatment at Middletown.

Significant opposition to low flow regulation pools upstream is rooted in a variety of factors, including but not limited to: resistance to upstream construction per se; power companies' insistence on payment for releases; interference with fish management; and the loss of valuable trout streams. Hearings conducted on the comprehensive plan for the Connecticut River have been discouraging to those who would carry water supply plans forward. Public reaction has been hostile.

In addition to the foregoing difficulties, considerable opposition can be anticipated even apart from the storage site problem. Any diversion of Connecticut water could adversely affect current efforts to restore shad runs and even Atlantic salmon in the lower portion of the river-- enterprises which have already absorbed a considerable amount of money. Opposition has also focused on a thermal plant proposed just below Middletown; the plant's adverse impact on the fishery restoration might be increased if there were a significant reduction in flow.

CONCLUSIONS - CONNECTICUT

Connecticut has sufficient in-state sources to meet its water supply needs during the study period. The projects listed in the Joint Venture draft study involving interstate transfers could confront many problems. Some engineering alternatives of a regional scale require new institutional arrangements for their construction and operation. These issues are currently being analyzed by state administrative agencies. The long-range, multipurpose water resources plan, coordinated by the Office of State Planning, is a composite of intrastate, regional water and sewer plans and a conscious effort to relate the competing demands for the state's water resources. Any future water supply development in Connecticut, whether by Connecticut water companies or federal or interstate agencies, will be affected by that plan.

C h a p t e r 3

WATER SUPPLY FOR NORTHEASTERN NEW JERSEY

INTRODUCTION

Water in highly urbanized northeastern New Jersey is distributed by a maze of municipal, regional, and investor owned companies whose service districts crosscut traditional political jurisdictions. Despite proposals to coordinate this tangle of water systems in order to better utilize existing supplies and discourage the wasteful competition for new sources, the situation has persisted. Customers are satisfied with the relatively low priced water they buy. State officials view the water supply problem as falling into two different arenas: (1) distribution, which for the most part, is left to the suppliers and (2) supplying the distributors with adequate sources of water, an arena in which the state participates.

The Joint Venture draft report, in keeping with the regional orientation of the NEWS study, also focuses its attention on the second arena-- supplying the distributors-- and does not attempt to sort out the problems of distribution. Ultimately it is imperative, however, to consider how the unanswered questions related to distribution affect important issues of supply development. This is illustrated by the case study of Raritan development discussed below in this chapter.

Timely resolution of conflicts among distributors over allocation and transmission of new supplies is crucial. It is also important to make

appropriate interconnections of systems within the study area, thereby reducing the aggregate need and hence the magnitude of additional supply required. It is plausible that the secondary transmission lines needed to deliver water to the water-poor areas might entail interconnection with the water-rich systems. If such were the case, then perhaps building the secondary transmission lines in the first place would allow for the appropriate intersystem transfers which would reduce the need for additional supplies to the study area.

In the second arena-- supplying the distributors-- the Joint Venture draft report concludes that substantial supplies will have to be developed from sources outside the supply area in order to meet estimated needs for 1980, 2000, and 2020. The listed sources include a combination of developments which technically would allow needs to be met via in-state sources (including the Delaware River) through 2000 but would require interstate development to satisfy estimated consumption in the year 2000 and beyond.

This chapter will first describe the organization and decision-making structure for water supply in northeastern New Jersey and, then, in that context, discuss for illustration the issues related to some projects cited by the Joint Venture draft report.

ORGANIZATION FOR WATER SUPPLY

An Overview

Northeastern New Jersey presents the most complicated water supply picture in the NEWS study area for several reasons. In the first

place, there is a large number of water suppliers of significantly different size and character. Of the 400 local water supply systems in the state of New Jersey, 90 operate in the northeastern New Jersey study area. These systems are municipally owned and operated, operated by commissions, or they are investor owned. Even among the eight major water suppliers which provide over 80 percent of the area's water, there are significant differences. Four are investor owned companies, two are municipal water systems, and the remaining two are water supply commissions which serve municipalities. For example, the Passaic Valley Water Commission comprised of the municipalities of Thurson, Clifton, and Passaic, also sells water to some 17 other municipalities plus the Hackensack Water Company. In turn, the Passaic Water Commission owns part of the Wanaque Reservoir system which is operated by the North Jersey District Water Supply Commission. The city of Newark, which has supply sources of its own, also owns part of the North Jersey District Commission Wanaque system. Thus, the city of Newark and the Passaic Valley Water Commission in effect compete with each other when they are looking for sources to supply themselves directly, but indirectly work in cooperation through the North Jersey District Water Supply Commission. Moreover, private companies, such as the Elizabethtown Water Company, also supply large areas of northeastern New Jersey, and finally the state of New Jersey constructs supply facilities and has on occasion proposed to distribute the water from its own facilities.

In sum, at least five types of suppliers operate in the North Jersey area the state, a geographically broad water authority (the North Jersey District Water Supply Commission), regional commissions comprised of member municipalities (e.g., the Passaic Valley Water Commission), municipalities (e.g., the city of Newark), and private companies (e.g., the Elizabethtown Water Company).

All of the major suppliers are regional in the sense that they serve more than one municipality; most also serve more than one county although few serve the entirety of any one county. Thus, there is little correlation between any of the major water suppliers and any given political jurisdiction. While similar circumstances are found in other states, the confusion resulting therefrom is particularly grave in northeastern New Jersey which, while a continuous urbanized area, has an unusually large number of political subdivisions.

Supply areas in most cases are outside of service districts, while transmission lines from the former to the latter often cross the transmission lines and service districts of still other systems. For example, the Jersey City municipal system has a transmission line which goes through the service area of the Hackensack Water Company and the Passaic Valley Water Commission and near the North Jersey District Water Supply Commission service area to the Jersey City reservoir. Similarly, the municipal system of the city of Newark has a transmission line which goes through the service area of the North Jersey District Water Supply

Commission and through the service area of the Passaic Valley Water Commission to its Charlottesburg Reservoir in the northwest.

While there is a large number of suppliers operating a complex set of systems, there is no key supplier or political subdivision upon which water supply development and operation naturally focuses. In most of the other NEWS study areas there is one key city or municipality in a region which is used as a base around which regional water supply plans can be made. For example, the city of Boston served by the Metropolitan District Commission clearly is the focal point for water supply planning in Massachusetts. In the state of Rhode Island, Providence is the key supply plant. However, within the northeastern New Jersey area alone, there is no city, no one water company which can be considered to be the major supplier of the entire area, nor is there one local political unit which clearly stands out above the rest as the potential leader in water supply development.

There are: (1) numerous plans with conflicting approaches and often conflicting data; and (2) no clear processes to mesh those plans, choose among them and compel water suppliers to comply with that choice. Each of the major suppliers is, of course, concerned with providing itself sufficient quantities of water to meet future demands and possibly to expand its market, and thus undertakes its own planning and competes for the relatively scarce supplies that are available. One finds a plethora of studies undertaken by agencies of all levels of government on their own or solicited from consultants or by the various water supply companies,

each to plan for, or to lend support to plans for, their own future needs. As a result there are numerous studies dealing with water supply for northeastern New Jersey often with conflicting conclusions and recommending different approaches for meeting future supply needs. Water supply planning has been characterized by constant debate and little positive action.

The State Administrative Structure

Largely as a result of the low priority given water supply by state leaders, administrative agencies have played a limited role in solving water problems at the local level. New Jersey was, however, the first state in the Union to become a supplier of water.

Department of Environmental Protection. Primary responsibility for water policy in the state of New Jersey falls under the Department of Environmental Protection which was created in the spring of 1970 from a portion of the Department of Health and the former Department of Conservation and Economic Development. All of the five divisions within the department have responsibility for some aspect of water resource planning and development. The Divisions of Fish, Game and Shellfisheries; Natural Resources; and Parks, Forestry and Recreation, all deal in some way with water resources. The Division of Environmental Quality is concerned particularly with pollution control and with regulation of public water supplies to guarantee potability. However, it is the Division of Water Policy and Supply which is most directly concerned with the problem of supplying adequate quantities of water to New Jersey localities.

The Division of Water Policy and Supply consists of a Council of Water Policy and Supply, and Bureaus of Water Control, Water Resources, and Water Supply. The division director, to date, has been a leader in the formulation and implementation of water supply policy. He is appointed directly by the governor and has strong staff support.

The council members serve without pay and tend not to have professional experience in water supply. The council has authority to hold hearings and issue permits for: (1) diversions of surface water for all public potable supplies constructed since 1907; (2) diversions of ground water for all public potable supplies constructed since 1910; (3) diversions of ground water in excess of 100,000 gallons per day constructed since 1947 for individual, industrial, irrigation or other similar uses in areas designated by the council; and (4) diversions of surface water in excess of 100,000 gallons per day constructed since 1964 for private, industrial, irrigation or other similar uses in the area as designated by the council. The council also has authority to require the interconnecting of public water supply systems with fair compensation and subject to review by the Board of Public Utility Commissioners.² The Bureau of Water Control provides the council staff assistance for its regulatory work.

The key water resources planning agent for the Division of Water Policy and Supply as well as for the state is the Bureau of Water Resources.

2. New Jersey Statutes Annotated, v. 58, §§1-10 and 1-25. The council also has certain nonwater supply regulatory authority including the issuing of permits for dam construction or flood control purposes (L. 1912, c. 243) and the establishing and marking of flood high water marks and flood plains (L. 1962, c. 19).

Aside from undertaking studies on specific problems of water management and development it also functions as the state coordinating body for studies and operations undertaken by interstate and federal agencies in New Jersey such as the United States Geological Survey, the Corps of Army Engineers, the United States Weather Bureau, and the Delaware River Basin Commission. Due to lack of resources and insufficient staff, the bureau has been unable to carry out the kind of long-range planning with which it is charged. Moreover, although the bureau is legally authorized to undertake long-range plans, it lacks the formal authority to develop and administer a statewide comprehensive plan for water resources. In 1965, state water planning expenditures amounted to about one cent per capita giving New Jersey a middle ranking in comparison to other states of the nation despite its unusually complex water problems.

Only \$44,200 was allocated in 1970 under state sponsored cost-sharing programs for research, all of which went to the New Jersey Water Research and Development Commission.³ The low level of support for state planning in general is also revealed in the salary schedules for the posts of director, economist, civil engineer, planner, and junior civil engineer, which, for the state civil service, are among the lowest of any in the nation.⁴

3. The commission was established to assist the legislature in keeping informed of water supply problems and the activities of the Water Policy and Supply Council and other agencies. Three of its nine members are appointed from the Senate by the president, three from the General Assembly by the speaker, and three from the public by the governor.

4. Daniel H. Hoggan, State Organizational Patterns for Comprehensive Planning of Water Resources Development (Logan, Utah: Utah Water Research Laboratory, College of Engineering, Utah State University, June 1969), pp. 184-186.

The Bureau of Water Supply with a staff of over 70, is the state's operating arm in water supply. It is responsible for the management, operation, and maintenance of state owned supply facilities including the Delaware and Raritan Canal and the Spruce Run/Round Valley Reservoir system. Any revenues from these operations go into the state treasury.

Largely owing to a lack of funding, the Department of Environmental Protection does not have the resources it needs for effective water resource management. Activities primarily consist in reviewing applications from local water systems. Applications for diversion rights are reviewed in an adjudicatory proceeding which requires public hearings and application of standards emphasizing the accommodation of conflicting proprietary interests and adequacy of engineering design.⁵ Since the initiative for water supply applications and development is left largely to local interests and private utilities without the benefit of a comprehensive state plan, local suppliers are in constant competition for the rights to develop new sources. Such competition rarely leads to the balancing of the area's long-term water needs. Applications tend to be awarded on the basis of satisfying technical design criteria, without direct consideration of externalities affecting recreation or conservation.

5. The statutory test applied to plans reviewed requires that they be "justified by public necessity and provide for the proper and safe construction of all work connected therewith, as well as for the proper protection of the supply; will not unduly injure public or private interest, and are just and equitable to the municipalities and civil divisions of the state affected thereby and to the inhabitants thereof, particular consideration being given to their present and future necessities for sources of water supply."

Department of Public Utilities. The Department of Public Utilities, whose policy is determined largely by a Board of Public Utility Commissioners, regulates more than 160 water supply and 50 sewerage companies in the state (in addition to gas, electric, communications and transportation companies).⁶ A 1967 survey by the Public Research Corporation of Plainview estimated that as many as 2.5 million of New Jersey's population of approximately seven million people live in areas served by investor owned water or sewerage companies.

The department's primary responsibilities are to approve applications to initiate or expand services to or within a municipality for the safety and adequacy of the systems and to review the prices charged by companies to their customers. Approval of water sources is granted to the companies by the Water Policy and Supply Council with respect to new source development, and by the Division of Environmental Quality for safety purposes. Historically, the three-member board (appointed by the governor for staggered six-year terms) has supported a low price policy favored by the water companies and their municipal customers.

Utilities in New Jersey are given an income benefit factor to cover part of capital costs. The Department of Public Utilities' Division of Rates and Research has traditionally placed low prices to users above

6. The department's authority also extends to those services of municipally owned companies which extend beyond municipal boundaries and where such extensions were originally part of an investor owned system and were purchased subsequent to 1929. The Trenton municipal water system also is regulated by the department.

conservation of resources. This low price policy has also had its effect on the pricing policies of the Bureau of Water Supply of the Division of Water Policy and Supply, as is evidenced in the price of water sold from the state's Raritan Valley system. Studies indicate that charges within New Jersey are among the lowest in the country, Raritan Valley water is sold at a wholesale price of \$34 per million gallons which is not sufficient to cover basic charges for operating the state owned system. Repeatedly, the state has had to appropriate funds to cover these costs, in other words, to subsidize private utilities and industrial interests drawing from the Raritan system.

Interstate Agencies

Several interstate agencies of importance to water resource development also operate within the state of New Jersey, including the Delaware River Basin Commission, the Tri-State Transportation Commission, and the Interstate Sanitation Commission.

Public and private water supply plans, submitted for inclusion in a compendium of projects proposed for the Delaware River Basin, are analyzed by the staff of the Delaware River Basin Commission to determine likely effects on other proposed developments. The system emphasizes the multipurpose perspective of the entire river basin achieved through independent staff review followed by public hearings on recommended actions, While the planning documents of the DRBC are made available on a continuing basis to cooperating state and local agencies, in general, there appears

to have been relatively little operational coordination between the commission and New Jersey water agencies.

The Interstate Sanitation Commission is a regulatory agency responsible for pollution control in tidal and estuarine waters of the New York Harbor, Hudson River, and Long Island coastlines. Thus, to date, it has been only peripherally involved with water supply planning.

The Tri-State Transportation Commission, while initially conceived and created to handle the transportation problems of the tri-state metropolitan area (including parts of New York, New Jersey and Connecticut) has gradually expanded its activities into other areas of public concern which other less broadly based agencies appear ill equipped to handle. "Tri-State" from time to time has undertaken various studies related to water supply which have been made available to state agencies in New Jersey.⁷

In addition to federal and interstate agencies operating within New Jersey, important programs of federal financing have also been available, usually on a matching fund basis. However, a recent study of federal aid to New Jersey by the state Department of Community Affairs indicates that the failure of the state to provide the necessary matching funds for federal grants is the primary reason for the scarcity of federal financing.

7. The commission's water-related reports include the following: Water and Waste in the Tri-State Region (August 1969), Water Supply and Sewerage Needs in the Tri-State Region, 1965-2000 (December 1969), Future Water Supply and Sewerage Needs and Proposals for Meeting Them (September 1968), Inventory of Water Supply, Sewerage, and Gas and Electricity Services (January 1967).

Indeed, New Jersey was 50th of the 50 states in the nation for per capita federal aid received during the department's study period.⁸

Local Organization for Water Supply

As indicated earlier, below the state level there is a multitude of water supply developers, wholesalers, and retailers of varying sizes and characters. The basic unit for water supply at the local level is the municipality, of which there are 567 in New Jersey. The report of the Joint Drainage Committee noted that:

. . . municipalities . . . are endowed with the most extensive powers to deal with water problems, yet in many ways, they are inadequate and unwilling decision-making units. The principal inadequacy . . . is their limited areas of jurisdiction in comparison with the geographical scope of most water problems.⁹

Most municipalities continue to operate their own retailing systems, but in the highly populated northeastern part of the state, all but the biggest municipalities have had to look to larger organizations for their supply needs. Some municipal suppliers such as the city of Newark and

8. Introduction and Summary: Federal Aid to New Jersey, State of New Jersey, Department of Community Affairs, Office of Program Development (November 1969), pp. 10 and 14. A number of qualifications were added to the principal findings of the state report. Among the items listed were the following: (1) valid reasons for turning down federal aid opportunities such as program requirements for obtaining aid which did not meet the particular needs of the state, (2) absence of qualifications for certain large federal aid programs such as those in agriculture due to the low ranking of this particular industry in the state, and (3) bias of certain formulas in favor of less populous rural states. See pp. 14-17.

9. As cited in Water Resources Management in New Jersey, Report by the State of New Jersey, Commission on Efficiency and Economy in State Government (November 1967), p. 56.

Jersey City act as regional suppliers, selling water to municipalities nearby or close to their transmission lines. Other major supply systems in the northeast are operated by regional public agencies such as the North Jersey District Water Supply Commission and the Passaic Valley Water Commission and by private companies such as the Hackensack Water Company and the Elizabethtown Water Company. The largest eight of the 90 northeastern New Jersey suppliers handle about 80 percent of the area's total need.

For the most part these regional suppliers undertake their own planning activities outside of the planning processes of higher levels of government. Commercial consultants often are relied upon for the bulk of the technical planning work. For example, the 1967 report by the consulting firm of Gilbert Associates, Inc., for the North Jersey District Water Supply Commission concluded that the future needs of the northeastern area require that the District Commission develop major new sources, including the construction of a major transmission line to the Raritan River. A subsequent study by Elson T. Gilliam Associates, Inc., financed by the Elizabethtown Water Company and presented to 11 municipalities in the northeastern area concluded that the District Commission's plans were invalid and that in fact the Elizabethtown Water Company should supply the necessary water including construction of the major transmission facility. The larger private utilities, some of which are the biggest in the nation, maintain in-house staff capability of unusually high caliber

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to carry out continuous short- and long-range planning of such subjects as consumer demand, source yield, and system performance.¹⁰

For over half a century the North Jersey District Water Supply Commission has offered municipalities in the region the opportunity to enter into a comprehensive regional system. However, the District Commission has been able to promote only one major system, the Wanaque Reservoir. The most important factor in the municipalities' lack of desire to participate in regional water supply systems appears to be cost. The availability of relatively cheap water from the private utility companies in fact relieves the municipalities of the need to look for their own water supply, or to involve themselves in the difficulties of a regional water supply organization. Without relative cost advantage it appears unlikely that municipalities will support regional cooperation in the future.

Nearly all of New Jersey's 21 counties have some form of planning agency, but these typically have limited ability to do water studies. Bergen County, for example, has periodically undertaken water

¹⁰. For example, the Hackensack Water Company which serves Hudson, Bergen and Rockland (New York) Counties, carries out sophisticated economic base studies, using its own data, to project water needs of the service area. It is assisted in these studies by the consulting firm of Buck, Seifert & Jost. George Buck of that firm is also president of the Hackensack Water Company. The Elizabethtown Water Company, which serves Essex, Union, Somerset, Hunterdon and Mercer Counties, conducts long-term planning at five-, 10- and 20-year intervals, supplemented by annual service load studies so as to determine the need for improvements in pumping, storage and transmission facilities.

supply studies, including a major work projecting source yield, population growth, supply system capacities, and interconnections of these systems.¹¹

Usually outside of the purview of the public agencies concerned with water supply are numerous industrial and small individual users in that state. The 1963 report by the Division of Water Policy and Supply estimated that industry was supplying itself with 480 mgd in 1950 and 576 mgd in 1960, or about twice as much water as it was purchasing from public supplies.¹² Private individual systems have been estimated to number between a quarter and a half million, almost all of which are beyond the effective supervision of municipal, county or state agencies.

The Government Context

New Jersey is the fifth smallest yet the most highly urbanized state in the country. Its historic sectionalism has diminished somewhat in recent years, but still important differences in outlook and needs exist between the largely rural southern portion of the state and the densely urbanized northern section. The well-known woes of old urban centers can be found in abundance in such cities as Newark, Jersey City, Paterson, and Elizabeth in the north; and problems associated with rapid, generally unplanned growth with governmental fragmentation plague large suburban areas ringing such old cities. Ninety percent of the state's

11. Report on the Present and Future Water Supply of Bergen County, Bergen County Water Study Committee (1957).

12. Max Grossman and Arthur L. Sherman, Present and Prospective Use of Water by the Manufacturing Industries of New Jersey, Water Resources Circular No. 11, New Jersey Division of Water Policy and Supply (June 14, 1963), p. 13.

citizens live in the suburbs. Urban problems are much farther from the daily lives of residents of South Jersey, whose political leaders, until recently, were able to control the dominant house of the legislature while representing only 19 percent of the state population.

The state is noted for an unusually strong concern for local autonomy and home rule, combined with reluctance to tax.¹³ Out-of-state focus characterizes many residents' lives: a large portion of North Jerseyans are oriented around New York City for their social, employment, commercial and cultural needs while daily papers from Philadelphia and Wilmington supply South Jersey with news that often contains scant mention of northern Jersey communities. Once described by Benjamin Franklin as a barrel tapped at both ends, New Jersey today is depicted by planners as a "corridor state"-- an important link in the East Coast megalopolis between New York and Philadelphia.¹⁴

13. As of 1964, New Jersey ranked seventh among the 50 states in per capita income. But in spite of its excellent endowment in human and physical resources, public services in the state government sector are impoverished. In 1964, New Jersey ranked 50th in per capita state taxes. Until recently (1965), the state had no broad-based tax at all.

14. For further background, see Bruce Bahrenburn, "New Jersey's Search for Identity," in Harper's Magazine (April 1964), and John E. Bebout and Ronald J. Grele, Where Cities Meet: The Urbanization of New Jersey, Vol. 22, New Jersey Historical Series (Princeton, 1964). Bebout and Grele note that "there are not powerful centers or foci for city leadership on urban problems. Even when the mayors of the state's six cities of 100,000 population or more speak together, they speak for only 19.2 percent of the population," p. 95. They suggest that the state can be better understood and governed in terms of the concept of the "City of New Jersey" than of the 567 "so-called" municipalities that comprise the total.

Above the many hundreds of local governments and special districts and the 21 counties of New Jersey is a highly integrated state government, presided over by a governor with exceptionally strong formal powers. He must deal with a small and traditionally powerful legislature in the context of a highly competitive, decentralized two-party system.

With the adoption of a new state constitution in 1947, following a series of statutes in the preceding decade that increased his authority, the New Jersey governor became "one of the strongest governors in the nation in terms of his administrative authority."

For a number of reasons, however, gubernatorial resources are not likely to be focused on state initiatives in water supply at this time (although effective leadership on water quality matters has already been exerted).

Leadership is rotated in the legislature, and the business of legislating is a part time affair in New Jersey. The bodies meet generally only one or two days a week from January to June. There are now relatively few experienced members in the Assembly where, after the 1967 election, 47 of the 58 Republican members were freshmen.

After emerging from committee, any bill must get caucus approval to be placed on the board. Thus, for effective blockage of a measure all that is needed is a "majority of the majority"-- at present, 20 of 39 Republicans, for example, out of 60 votes in the Assembly. This system defeated the Spruce Run/Chimney Rock Reservoir proposal in 1955, opposed by a small group of northwestern legislators.

The legislature does not act upon decisions of the Water Policy and Supply Council, but it must approve all bond issues over \$50,000 before they can be submitted to the electorate. An 11th hour attempt was made last year to kill the 1969 bond issue on the floor of the legislature because utilities wanted to insure that one of the reservoir sites up for acquisition (Two Bridges) would remain available to private developers. If successful, such opposition would have defeated the entire sewerage program as well.

OPPORTUNITIES FOR REGIONAL APPROACHES

As mentioned above, in northeastern New Jersey there is reason to believe that more comprehensive intersystem management could release locked-in water surpluses. Hence this represents important supplementary opportunities for improvement through regionalization.

For example, the Quirk, Lawler & Matusky¹⁵ study undertaken in 1968 for the Corps of Engineers concluded that with expansion of existing systems and appropriate intersystem transfers, significant new capacities could be developed. The report found:

Interbasin transfers from the Raritan to the Passaic and from the Passaic to the Hackensack, making use of existing facilities, relaxed operating rules and existing utility transmission interconnections, can provide at least 140 percent of its current demand to each utility in the three basins.¹⁶

15. Quirk, Lawler & Matusky Engineers, Surface Water Supply Capabilities of Northeastern New Jersey River Basins, prepared for the U. S. Department of the Army, Corps of Engineers, North Atlantic Division, 1968.

16. Ibid., p. S-2.

The engineers further concluded that "provision of planned supply improvements . . . can provide 190 percent of its current demand to each utility in the three basins."¹⁷

The importance of, and benefits to be derived from, tighter operation of existing distribution systems was underscored in a recent study carried out for the Office of Water Resources Research.¹⁸ Based upon computer simulation of the several water "systems" in the New York metropolitan area under stress (drought) conditions, the study concluded that "an unmistakable manifestation of system failure, as we have defined it, is the presence of a locked-in water surplus at any node in the network while a deficit exists elsewhere. System rigidity is responsible. . . . In each (deficient system) the surplus was adequate to mitigate all or part of the stress. The necessary transfers could be accomplished only by postulating new or expanded links."¹⁹

The report also found that:

The northeastern New Jersey system failed under conservative demand estimates for 1970 (to adequately respond to simulated stress conditions). Five agencies were not able to satisfy their

17. These planned supply improvements in the Raritan included "increased Round Valley storage, the Confluence Reservoir and pumping station, Delaware and Raritan Canal renovation and Six Mile Run Reservoir, and 126 mgd of additional transmission from the Raritan to the Passaic, and of 40 mgd from the Passaic to the Hackensack, joint system operation in the Passaic, and some 245 mgd of additional treatment." Ibid., p. S-2.

18. Leonard Zobler and George W. Carey, Benefits from Integrated Water Management in Urban Areas - The Case for the New York Metropolitan Region, a report submitted to the Office of Water Resources Research, U. S. Department of the Interior (April 1969).

19. Ibid., p. VIII-2.

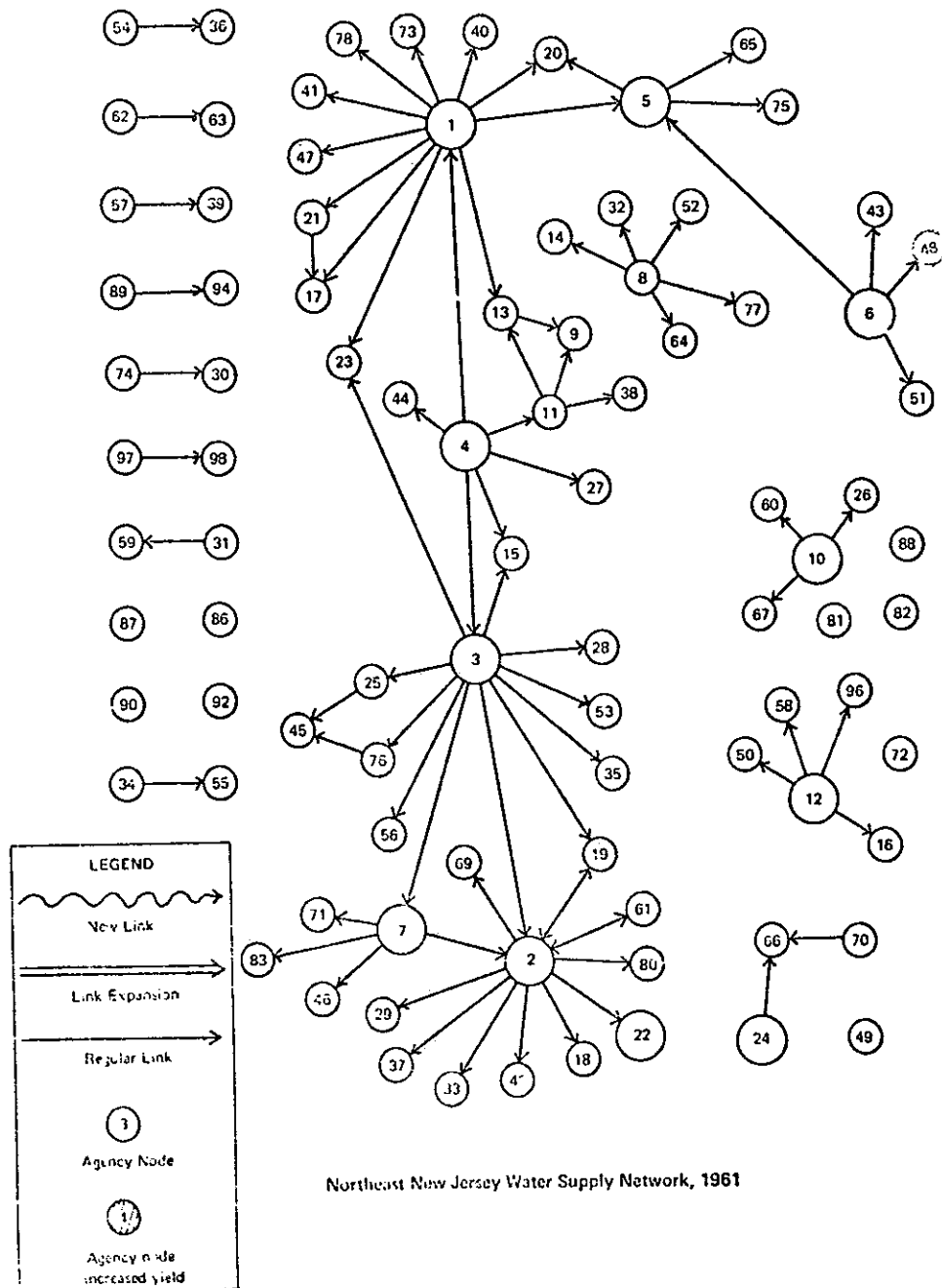
demands by 26 mgd while a surplus of 146 mgd was locked-in twenty-three agencies. Demand was satisfied when five links were expanded and free transfers allowed without the addition of new water. In this particular solution several other transfers were revealed as superfluous and the total volume of water transferred fell. There also was sufficient water available to satisfy present trend demand estimates to 1970, with four additional transfer expansions. The system also 'generated' a surplus of 58 mgd.²⁰

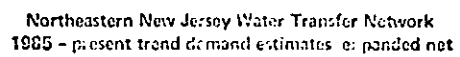
The point of this exercise was to determine how the existing system might have functioned under the drought conditions of the early 1960's with a more efficient network of transfers and more effective regional management. The conclusion was that where the system faltered during the actual drought, the same system with no incremental supplies, but with appropriate transfers and regional management could meet 1970 demand under those same drought conditions.

The Zobler study concluded that a system providing for the transfer of water from a supplier with a surplus to other suppliers with a shortage would improve the allocation of the existing sources, and postpone the need for development of new resources.

The diagrams on pages 112 and 113 illustrate the nature of the northeastern New Jersey network and how additional transmission lines, with corresponding transfer, might produce more efficient use of existing supplies. Page 112 depicts the transfer network as of 1961. Page 113 includes the interconnections added to the current network necessary for optimum use of locked-in surpluses, according to the Zobler report.

20. Ibid., p. VIII-3.





Northeastern New Jersey Water Transfer Network
1985 - present trend demand estimates expanded net

List of Identification Numbers for
New Jersey Water Supply Agencies Included in Diagrams

(County Names in Parentheses)

- | | |
|---|---|
| 1. Passaic Valley Water Commission | 28. Belleville (Essex) |
| 2. Elizabethtown Water Company | 29. Bound Brook Water Company
(Somerset) |
| 3. Newark | 30. Brielle (Monmouth) |
| 4. North Jersey District Water
Supply Commission | 31. Butler (Morris) |
| 5. Hackensack Water Company | 32. Caldwell (Essex) |
| 6. Jersey City | 33. Camp Kilmer (Middlesex) |
| 7. Commonwealth Water Company | 34. East Orange (Essex) |
| 8. Essex Fells (Essex) | 35. Essex County Hospital |
| 9. Cedar Grove (Essex) | 36. Franklin Lakes (Bergen) |
| 10. Monmouth Consolidated Water
Company | 37. Franklin Township (Somerset) |
| 11. Montclair (Essex) | 38. Glen Ridge (Essex) |
| 12. New Brunswick (Middlesex) | 39. Gravity Water Company
(Somerset) |
| 13. New Jersey Water Service
Company (Passaic) | 40. Haledon (Passaic) |
| 14. Verona (Essex) | 41. Harrison (Hudson) |
| 15. Bloomfield (Essex) | 42. Highland Park (Middlesex) |
| 16. East Brunswick (Middlesex) | 43. Hoboken (Hudson) |
| 17. East Paterson (Bergen) | 44. Kearny (Hudson) |
| 18. Edison (Middlesex) | 45. Lincoln Park (Morris) |
| 19. Elizabeth (Union) | 46. Livingston (Essex) |
| 20. Fair Lawn (Bergen) | 47. Lodi (Bergen) |
| 21. Garfield (Bergen) | 48. Lyndhurst (Bergen) |
| 22. Middlesex Water Company | 49. Madison (Middlesex) |
| 23. Nutley (Essex) | 50. Milltown (Middlesex) |
| 24. Perth Amboy (Middlesex) | 51. North Arlington (Bergen) |
| 25. Pequannock Township (Morris) | 52. North Caldwell (Essex) |
| 26. Asbury Park (Monmouth) | 53. North Jersey School-Totowa
(Passaic) |
| 27. Bayonne (Hudson) | 54. Oakland (Bergen) |

55. Orange (Essex)
56. Packanack Lake (Passaic)
57. Peapack-Gladstone (Somerset)
58. Personal Products, Milltown
(Middlesex)
59. Pompton Lakes (Passaic)
60. Portaupeck Water Company
(Monmouth)
61. Rahway (Union)
62. Rockaway Boro (Morris)
63. Rockaway Township (Morris)
64. Roseland (Essex)
65. Saddle Brook (Bergen)
66. Sayreville (Middlesex)
67. Shark River Hills Water
Company (Monmouth)
69. Somerville (Somerset)
70. South Amboy (Middlesex)
71. South Orange (Essex)
72. Spotswood (Middlesex)
73. Totowa (Passaic)
74. Wall (Monmouth)
75. Wallington (Bergen)
76. Wayne (Passaic)
77. West Caldwell (Essex)
78. West Paterson (Passaic)
80. Winfield (Union)
81. Allenhurst (Monmouth)
82. Avon-by-the-Sea (Monmouth)
83. Bernards Water Company
(Somerset)
86. Freehold Township (Monmouth)
87. Freehold Boro (Monmouth)
88. Ideal Beach Water Company
(Monmouth)
89. Keyport (Monmouth)
90. Morristown (Morris)
92. New Jersey State Hospital-
Greystone Park (Morris)
94. West Keansburg Water Company
(Monmouth)
96. North Brunswick (Middlesex)
97. Matawan Township (Monmouth)
98. Clifford Beach Water Company
(Monmouth)

List of Agency Numbers in
Expanded New Jersey Network

- 131. Allendale (Bergen)
- 135. Boonton (Morris)
- 136. Chatham (Morris)
- 138. Denville (Morris)
- 139. Dover (Morris)
- 143. Florham Park (Morris)
- 148. Hohokus (Bergen)
- 156. Madison Boro (Morris)
- 157. Mahwah (Bergen)
- 165. Mountain Lakes (Morris)
- 169. Park Ridge (Bergen)
- 171. Parsippany-Troy Hills (Morris)
- 173. Ramsey (Bergen)
- 175. Ridgewood (Bergen)
- 176. Riverdale (Morris)
- 182. South Brunswick (Middlesex)
- 183. South River (Middlesex)
- 187. Waldwick (Bergen)
- 189. Wharton (Morris)

Source: Leonard Zobler and George W. Carey, Benefits from Integrated Water Management in Urban Areas-The Case for the New York Metropolitan Region, a report submitted to the Office of Water Resources Research, United States Department of the Interior (April 1969).

Organizational imperatives and restrictions are implied by the features of the distribution system. It would appear that the complexity of delivering water from the study area's center to the individual supplier is such that a single authority would be better able to direct the entire operation.

Raritan River Development: A Case Study of
New Jersey Water Management

The following case study illustrates how the organizational, legal and economic-interest factors interact in the process of implementing water supply development; and the problems besetting the existing regional organization-- the District Commission.

By the 1950's, most of the surface water sources readily available to supply northeast New Jersey had been developed to capacity. One major exception was the Raritan River which had been only partially developed by the Elizabethtown Water Company. For more than two decades a debate ensued over who would develop the Raritan, and who would deliver the new supply to the municipalities of northeast New Jersey.

Competing for the development role were the state of New Jersey and the North Jersey District Water Supply Commission. The state won that battle and built the Round Valley and Spruce Run Reservoirs.

Competition for the right to divert the new supply from the Raritan basin to the northeast population center initially was also between the state and the District Commission. Subsequently, the Elizabethtown Water Company put in its own bid to be the principal distributor. The state has

put aside the idea of distributing the water itself, but is still very much involved in the controversy as the ultimate authority to determine who, in fact, will become the distributor. For a while, the situation was further complicated by Newark's announced intention of creating a municipal water authority which would build a transmission line from the future Tocks Island Reservoir on the Delaware River and thereby become the principal water supplier in northeastern New Jersey. To date, the question of who will deliver water from the Raritan to northeastern New Jersey remains unanswered.

After several unsuccessful attempts to arrange interstate water supply development-- first with the Interstate Commission on the Delaware basin (Incodel), and later via a bistate approach with Pennsylvania-- the state of New Jersey in 1954 began serious investigation of in-state sources. The state's Department of Conservation and Economic Development turned its attention to the development of Round Valley, a natural reservoir site which was also of interest to the North Jersey District Water Supply Commission.²¹

The District Commission had been created in 1916 to plan, build, and operate water supply and control projects for municipalities

21. The state had acquired the Delaware and Raritan Canal and began developing it as a source of potable supply just after World War II, thus making New Jersey the first state in the nation to undertake its own water supply development. Subsequently, the state also acquired extensive ground water reserves in the Wharton Tract in southern New Jersey.

in the 12-county area of North Jersey.²² In 1954 it revived a plan originally conceived by the state's Water Policy Commission to develop the Round Valley site.²³

Thus, the District Commission and the Department of Conservation and Economic Development entertained similar plans for managing the Round Valley development. The department made several attempts to gain legislation authorizing development of the reservoir, all of which failed. In 1955 the department attempted to sidestep the Round Valley issue by proposing the development of a reservoir at the Chimney Rock site in Somerset County. Despite heated opposition from residents and other public and private suppliers, the legislature passed a bond issue bill providing \$60 million for the construction of Chimney Rock. Ultimately, however, the bond proposal was turned down at the polls. The New York Times attributed its failure to an "anti-borrowing trend, faulty management of the bill, sectionalization, and lack of Democratic enthusiasm."²⁴ Others noted that

22. The NJDWSC is composed of five members appointed by the governor. It has authority to approve or disapprove municipal water applications subject, however, to the further approval of the Water Policy and Supply Council. The North Jersey jurisdiction includes Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union, and Warren Counties. The District Commission completed the Wanaque Reservoir system in 1928; since that date it has added no additional supplies. The same legislation created a similar South Jersey Water Supply Commission which to date has not been activated.

23. Report on a Water Supply Development to the Cities of Newark, Elizabeth, and Hillside, North Jersey District Water Supply Commission (November 1954). This report was inspired by the drought of 1944, thus taking 10 years to complete. A second drought in 1953 spurred completion of the study by 1954.

24. As cited in The Water Crisis in Northern New Jersey, Regional Plan Association, New Jersey Committee (1965), p. 2.

in 1944 engineers had rejected the Chimney Rock site as too highly developed for reservoir construction.²⁵

In 1956 legislation was enacted empowering the state to acquire the Round Valley site as a future reservoir site to store diversions from the Delaware River. At the same time the next in a long series of study committees was formed to further investigate possibilities for developing the Raritan. The keynote of the committee's report submitted in April 1957, was that the state should develop Round Valley and an additional reservoir on the river at Spruce Run in Hunterdon County, utilizing Raritan River water as well as Delaware diversions.²⁶

Finally, in 1958, legislation and a bond referendum were passed. Memories of the 1957 drought helped pass the Water Supply Law of 1958²⁷ and a \$39.5 million bond referendum authorizing state construction of the Spruce Run/Round Valley system.

Wide acceptance of the 1958 law was enhanced by the accommodation of several interests at the precommitment stage of policy-making. In the negotiations prior to enactment a compromise was reached whereby the Department of Conservation and Economic Development gained operating control of the two reservoirs and supervision of extensive water resource studies. One reservoir, Spruce Run, would meet the flow augmentation demands of downstream industrial interests. The other reservoir,

25. Ibid., p. 2.

26. The committee also recommended the development of a reservoir at Stoney Brook in Mercer County, but strong opposition from local citizens, particularly from the affluent Princeton area, caused that proposal to be dropped.

27. New Jersey Statutes Annotated, v. 58, §22-1, et seq.

Round Valley, would be an offstream storage facility using Raritan waters for the benefit of northern communities. Although the law itself made no express provisions, it was commonly understood at the time that the District Commission would undertake construction and operation of the transmission lines from the Round Valley Reservoir to a northern terminal at Newark.

Following enactment of the Water Supply Law of 1958 the District Commission and the state continued joint efforts to implement the program. Legislative policy required satisfactory assurances of financing "at the users expense" so as to guarantee revenues for payments of principal and interest chargeable to the program according to bond requirements.²⁸ A 1961 feasibility report by the consulting firm of Capen & Purcell to the District Commission indicated that no fewer than 22 municipalities had applied for participation with a total prospective subscription of nearly 82 million gallons per day.²⁹

In 1962 the Water Transmission Facilities Act³⁰ was passed by the legislature amending the charter of the District Commission to permit bonding for the pipeline from the North Dam of Round Valley, but requiring that a minimum subscription of 50 mgd be obtained from participating municipalities before construction began. This demand guarantee seemed well within the preliminary bids of 82 mgd. At this point, however, a new

28. New Jersey Statutes Annotated, v. 58, §22-2(g), 10.

29. Treatment and Transmission System Report, 1961, Table I.

30. New Jersey Statutes Annotated, v. 58, §5-31, et seq.

controversy flared when the North Jersey communities reacted against the higher price they would be asked to pay for the District Commission's Spruce Run water.

Initially the state was firm in its intention to charge prices for its newly developed water sources which would pay the cost of construction and operation. The key question, however, was whether the Round Valley and Spruce Run Reservoirs should be considered two distinct projects, or two components of the same system. As two distinct projects, the reservoirs would carry significantly different prices. In the first place, Round Valley involved complex arrangements for conveyance and storage making it more costly. Moreover, the District Commission, by drawing all of its water directly from the Round Valley Reservoir, would have paid two and a half to four times as much as the suppliers who diverted water from the Raritan and thus only required the flow augmentation of Spruce Run for a few months each year.

The District Commission and North Jersey municipalities continued to oppose the rate differential, while the state-- cognizant of its priority on self-financing-- and the Central Jersey users favored it.

The dispute dragged on until the increasingly grave drought conditions of 1964. A new commissioner of Conservation and Economic Development and the Water Policy and Supply Council decided that with a different project design both Spruce Run and Round Valley water could be released into the Raritan River and diverted at a common point,

Bound Brook, by all contractual users. Thus, the reservoirs would be considered components of the same system and the charge to water users would be the same (with the proviso that latecomers-- largely from the north-- would pay a progressively higher price to equalize the burden of amortization and interest). The result would be lower costs for North Jersey users and benefits to Raritan basin interests since both new reservoirs would be used for low flow augmentation.

The pricing incentive for early participation, however, did not accelerate subscriptions. It was two more years before the 11th municipality (Bayonne in 1966) contracted with the District Commission for the additional amount needed to assure sales of 50 mgd. Indeed, convincing the North Jersey municipalities to sign required a great deal of persuasion by the District Commission.³¹ Delays and undetermined cost increases were also caused by the engineering redesign necessary to make Spruce Run and Round Valley into a system of balancing reservoirs. The District Commission and the department had to undertake additional planning of transfer facilities and capital cost and pricing computations. None of the parties was satisfied with the uncertainty which prevailed.

Another important result of the decision was to place the Elizabethtown Water Company in a strategic position for an expanded role as supplier. Elizabethtown had obtained the right to divert water from

31. The 11 municipalities joining the District Commission plan were Glen Ridge, Cedar Grove, Verona, West Caldwell, Nutley, Newark, South Orange, Bloomfield, Bayonne, Kearny and Elizabeth.

the Raritan in 1918 and since constructed and utilized diversion facilities at Bound Brook.³² With the state decision that all Raritan diversions would be from Bound Brook the company stepped up an aggressive expansion program to become the principal supplier to the northern municipalities.³³ During the severe drought of 1963-1965, when northern municipalities realized the immediacy of their need and began a frantic search for water, the uncertainty over the District Commission's pipeline plans enhanced Elizabethtown's position.

Inadequacy of supplies of the city of Newark as with many other municipalities had reached crisis proportions by the summer of 1965. Elizabethtown's pipeline terminated within a few miles of the city line, thus providing a ready solution. With the assistance of the department and other state officials arrangements were made for a link between the Elizabethtown and Newark systems at Linden. Early resistance by the city of Elizabeth³⁴ was cleared and the parties proceeded to negotiate terms. The department pressed for a contract of short duration (one year) but the principals insisted that the cost of the project would not justify construction for such a short period. The department conceded and an intermediate length contract covering a period of 10 years was signed.

32. In 1964 the Water Policy and Supply Council ruled that the Elizabethtown Water Company would have to pay for the 20 mgd Raritan diversion which until that date had been used free of charge.

33. The acquisition scheme has been without rival in the state. Within the decade of the sixties Elizabethtown tripled its operating jurisdiction through purchase of utilities and franchises, 1969 Annual Report Elizabethtown Water Company, pp. 8-9.

34. The New York Times, July 13, 1965.

The project was implemented and completed in the record time of two months. Newark had its "temporary" relief. The drought came to a close shortly thereafter during the winter of 1965-1966.

Newark officials began promoting establishment of a Newark Municipal Utilities Authority under recent general enabling legislation. Preliminary arrangements were made for the wholesale transfer of assets of the city water department to the new authority. Plans were developed for acquisition of water from the Delaware River, and were acted on without the authorization of the state presumably because of assumptions regarding the supremacy of the federal-interstate agency governing the Delaware basin.³⁵ Purchase of the "Susquehanna Aqueduct," a 34-1/2-mile railroad right-of-way running between the city's Pequannock Watershed sources and the Delaware immediately below the Tocks Island dam site, put the city closer to realizing the goal of becoming the "waterwheel of the north."³⁶

Newark's opposition to the District Commission surfaced in 1967 when the City Council passed a resolution to rescind its subscription commitment. A suit was brought protesting the city's action and a lower court

35. The following letter by Anthony P. LaMorte, executive director of the Newark Municipal Utilities Authority to the department on February 20, 1969 in reply to a request to submit plans reveals the confusion over authority to divert and sell Delaware River water: "Finally, does the State, under the law, have the jurisdiction it is now exercising in matters relating to the Delaware River Basin Commission? It would appear that at the very least some Federal and State policies are in conflict, and it may be helpful for the future of all water users to seek definitive answers with the parent Federal agency."

36. So described by Assemblyman Herbert Rinaldi in an interview, June 11, 1970.

found the contract to be binding.³⁷ This result and the ensuing appeal,³⁸ along with resistance within the city to final creation of an authority, were to occupy the attention of "waterwheel" advocates for some time to come.

While the Newark challenge soon faded, the city's independent attitude set an example for other northern municipalities. The District Commission's troubles were further complicated when a long-awaited engineering feasibility study³⁹ was published in 1967, confirming expectations of rising costs for the District Commission's pipeline plan. Projected retail costs of water ranged from 150 percent to 200 percent higher than existing supplies and the other cooperating municipalities soon began to object. The legislative response was appointment of another temporary commission.⁴⁰

37. 103 N.J. Super. 542, 248 Azd 249 (1968), aff'd. 52 N.J. 134,244, Azd 133 (1968).

38. 106 N.J. Super. 88, 254 Azd 313 (1968).

39. Gilbert Associates, Preliminary Engineering Study and Feasibility Report on the Raritan River Project, prepared for the District Commission (1967).

40. Legislative Commission to Study the Advisability and Practicability of Formulating and Implementing a Comprehensive Water Supply Policy and Program to Meet Long Range Water Needs. Assem. Resol. #31 (1968).

Hearings held by the study commission in 1968 produced the first exposition of the rival plans of the District Commission and the Elizabethtown Water Company.⁴¹

Elizabethtown contended that the District Commission pipeline would duplicate the company's own existing line that could be increased in capacity quickly, as needed, without expense to the state. The district's pipeline, on the other hand, would require subsidy by the state, contrary to the intent of the 1962 bond authorization law, in the amount of \$60-\$65 million. Thus, concluded Elizabethtown, costs of retail water supplied by Elizabethtown would be significantly less since no wholesale capital improvements would be required.

The District Commission replied that public ownership of the system might cost more initially but would eventually result in lower retail costs than could be offered by a private utility (citing such differences as public utility tax exemptions, guaranteed private utility profit margins, and ultimate elimination of carrying expenses for capital improvements owned by the customer municipalities). Elizabethtown's plan for the northeast communities called for sale on an interruptable basis and would

41. Multivolume transcripts of the commission hearings. The Gilbert report proposed a pipeline paralleling Elizabethtown's as a result of re-study following the 1964 decision of the Water Policy and Supply Council (ante). Elizabethtown's plan envisioned gradual expansion of its Bound Brook-Linden pipeline by a process of "looping," in which sections of a larger main would be tied in alongside the existing line so as to increase total capacity. The phrase "surplus water" describes water sold on an offpeak basis, i.e., water in excess of the continuous needs of communities under long-term franchise contracts of the company, measured by peak demand, would be sold to outlying communities.

consist of "surplus" water so that service could be stopped at any time. The district also intimated that retail prices would be higher after the company had gained a monopoly position.

The study commission reported its recommendations in 1969 favoring most of the particulars advanced by the District Commission. It recommended that the unfortunate circumstances of the municipalities cooperating in the district's plan should be alleviated by the state through subsidy of the 14 mgd overcommitment of the plan;⁴² public ownership of the transmission line could produce lower costs in the long-run and thus should receive further consideration, the Newark and Elizabethtown plans should be rejected as involving too much uncertainty as to financing, capacities, timing and interconnection of distribution systems (specifically, Elizabethtown could offer no guarantees on future prices of continuous supplies); and finally, that the so-called "by-pass line" proposed by the District Commission to link the Elizabethtown line with communities in the service territory of the Hackensack Water Company warranted further investigation.⁴³

42. State subsidies were recommended for two separate items: 9 mgd, to which the overall project was committed under water rights acquisition applications and agreements, and 5 mgd, for which the municipalities had overcommitted themselves by extravagant estimates of future needs (and caused by a mixture of subscription sign-up pressuring and drought crisis planning).

43. The by-pass line proposal would transmit water through the Elizabethtown line which would be interconnected with a newly constructed line at Linden running around Newark to communities in northeast Bergen County (including the Meadowlands). Need for reliance on the under-capacity Newark line would thus be circumvented.

Despite the promise of objectivity in the commission's report,⁴⁴ none of its recommendations were acted upon. Municipalities were more impressed with Elizabethtown's promise of immediate low prices than the District Commission's pledge of lower prices in the long run. Officials in the areas of origin continued to protest and responded to Elizabethtown's subtle suggestions that sales of water on an interruptable basis would protect future basin needs for "their" water.⁴⁵

To more forcefully drive home its case, Elizabethtown retained the consulting firm of Elson T. Killam Associates, Inc. "on behalf of" the cooperating municipalities to reassess the comparative costs of the District Commission and Elizabethtown plans. In the winter of 1969-1970, the Killam report was issued with the conclusion that savings would be had by all 11 of the municipalities, if they joined in the Elizabethtown plan; its summary estimated savings of no less than \$63 million over the period of the next 10 years. This prompted a landslide of further resolutions by the affected municipalities detracting from the District Commission's plan. And the prospects for near-term solution dwindled.⁴⁶

44. The reapportionment of 1967 resulted in a commission membership which was freed to some extent of party bias despite its sectional bias. All commission members were recently elected officials, and source areas in the Raritan Valley were represented. Membership included two representatives of Essex County and others from Bergen, Hudson, Morris and Middlesex Counties.

45. A resolution of the Hunterdon County Board of Freeholders, August 28, 1968, referred to "Hunterdon County Water" in protesting out-of-basin transfers of Raritan water.

46. Newark News, July 2, 1970.

To date, the issue of who will deliver Raritan water to North Jersey has yet to be resolved. The District Commission still has its application for diversion rights for water to feed its pipeline pending before the state Water Policy and Supply Council. The few remaining municipalities who have not formally requested withdrawal from the plan nevertheless appear inclined to do so. A special legislative committee to investigate the supervisory role of the Water Policy and Supply Council is contemplating a bill which would strip the District Commission of its bonding authority (thus nullifying its ability to perform the contract with participating municipalities) and has introduced bills to end its regulatory authority.⁴⁷ And further extension of Elizabethtown's delivery capability is proceeding, along with continued dissemination and promotion of the Killam report and its findings.

ORGANIZATIONAL, LEGAL AND NONMONETARY
ECONOMIC FACTORS AFFECTING FEASIBLE ALTERNATIVES
FOR IMPLEMENTING REGIONAL PROJECTS

State Government Approaches

New Jersey water planners recognize the necessity of resorting to wholly new means to supply northeastern New Jersey's needs before the end of the century. Three new sources contemplated by the state planners also have been considered by the draft Joint Venture study. These include out-of-state supplies, principally, the Hudson River; out-of-basin supplies

47. Sen. No. 766, introduced April 13, 1970; seeks repeal of R.S. 58: 5-27.

including the Delaware River and South Jersey ground water; and new technologies, notably desalination.

Although the Hackensack Water Company (which currently utilizes the Hackensack River under interstate agreement) has already been discussing applications for Hudson water, most officials agree there would have to be clear evidence of cleaner water from the Hudson River before that source would be accepted. But despite this reservation and the reluctance to entertain projects entailing interstate complications, it is widely argued in water circles that the Hudson will loom larger in New Jersey's water future. The acceptability of interstate arrangements also depends in part on the cost and reliability of the planned implementation schedules.

The relatively low costs associated with tapping South Jersey ground water for use in the populous northeastern part of the state make this alternative very attractive to water officials. However, as noted below, political opposition to such a project is considered to be potentially very strong; and ecological implications need study. Even though legislative power has shifted to the north as the result of the "one-man, one-vote" ruling, forces in the south are still strong and would certainly be supported by state conservation groups should potential dangers to the Pine Barrens not be considered.

Because of the narrowing gaps between interstate supplies and demand, and also because of the historical difficulties in arriving at

agreeable interstate arrangements, New Jersey has been relatively progressive with respect to considering the application of new technologies for water supply. At least two federally aided studies of new systems are presently under way in the state. The Rinaldi commission did not investigate these possibilities but stated that "it is obvious that this is an area in which continued concentrated study should be made" despite apparently prohibitively high costs at the present time.⁴⁸ Areas recommended for further study include desalination and waste water reclamation.

New Jersey water officials have expressed some reservations about regional approaches listed by the draft Joint Venture report. These are factors that must be recognized in order to design feasible alternatives for regional implementation. One disagreement relates to the possible yield from the Raritan through full utilization of existing reservoirs. State water officials maintain that additional projects must be listed for Monmouth County and part of Middlesex County and in-basin needs in other areas.⁴⁹ They also maintain that the Delaware projects listed should more closely reflect the DRBC's comprehensive plan.

48. Legislative Commission to Study . . . , op. cit., p. 14.

49. In a letter from Commissioner Shanklin to Major General Charles M. Duke dated December 4, 1969, this view is expressed: "None of the presentations in the report properly represent the approved plans of the state for development of the surface water resources of the Raritan basin for in-basin use and reuse and for ultimate sale out of the basin on the lower Raritan River at Bound Brook," p. 6.

Another difficulty concerned the choice of Secaucus as a primary terminal point.

Four projects included in the New Jersey 1969 bond issue for site acquisition were considered in the draft Joint Venture report but were not included in the regional programs. These include the Two Bridges project (P-1), the Confluence Reservoir (R-2), the Six Mile Run (R-6), and the South River Tidal Dam (R-8).

Illustrative Discussion of Some Project Alternatives

Raritan Mainstem Development

One of the key projects in further developing the waters of the Raritan River is R-1 as listed in the draft Joint Venture study. This project would increase the yield of the Raritan River by some 70 mgd over present water consumption by full utilization of Spruce Run and Round Valley Reservoirs. These facilities currently produce 180 mgd, 90 mgd of which is allotted to water supply and 90 mgd to maintenance of river flow for downstream industries. Thus, with the additional 70 mgd these facilities would produce a total of 250 mgd, 160 mgd of which would be available for water supply. State plans to build the Confluence Reservoir would not be adversely affected thereby.

Above the diversion point at Bound Brook water quality is presently fairly good. While reduction in flow below Bound Brook would have an adverse impact upon water quality, recreation, fish and wildlife, and

ecology, it is important to note that this project involves what is essentially new water obtained through better utilization of existing facilities. These potential costs, then, are in the nature of opportunities foregone rather than damage actually done.

By diverting water at Bound Brook that might otherwise be used to increase stream flow into the estuary, the project foregoes possible gains in water quality in the lower Raritan River and Raritan Bay. A principal factor in Raritan Bay pollution, however, is industrial effluent flowing into Arthur Kill (between Staten Island and New Jersey); compared to this source, effluent carried down the river is relatively inconsequential.

During low flow periods, the north branch might benefit from the project and the south branch would suffer. Whatever water quality reduction would result would therefore hurt recreation in the south branch. Below the diversion, in the estuary, boating could be adversely affected by reduced flows. A higher level in the Round Valley Reservoir, where boating is permitted, could presumably produce some benefits to recreation.

There are no important fishing areas below Bound Brook. The north and south branches of the Raritan are both stocked, and both are popular among fishermen. To the extent that the river flow is made more uniform, resident species would benefit; if flow fluctuations were out of phase with the reproduction cycle, the project could have a negative

impact on the fisheries although this would be unlikely with proper management.

Possible negative impacts on the ecology of the north branch should also be considered. Any fluctuation is viewed as upsetting the natural regime, especially in such cases as flooding of wetlands. Problems might be encountered in the Rockaway Creek area, where construction would be required to accommodate the increased flows.

Considering the Raritan basin as a whole, it appears unlikely that serious objections will be raised from Morris and Hunterdon Counties against taking additional waters out of the area. Not only is it unlikely that the 70 mgd could be utilized within the basin, but also after about 10 years it is safe to say that the Round Valley/Spruce Run battles have already been fought and are unlikely to be re-enacted, assuming proper handling and appropriate management to guard against the above-mentioned potential dangers.

According to some sources, the construction of a pipeline in either of two routes from Bound Brook to Secaucus would pose much more serious obstacles in implementation. Construction of a pipeline is disruptive whatever the design, even though there are some ancillary benefits since footpaths and bicycle routes could be constructed along the right-of-way. However, it appears that estimates of resistance on this score have been exaggerated, and one of the would-be developers has already acquired a substantial portion of one of the rights-of-way. As was pointed out in the case study of the Raritan River development, alternative plans

have been debated over the past years with no apparent relief in sight. Aside from the likely unwillingness of residents to yield property for the right-of-way, other factors have influenced objections to the plans. These include discord among the cities involved, each of which has its own ideas on how to get water. Newark feels, for example, that its supply needs can best be met in the medium term more cheaply without a pipeline.

South Jersey Ground Water

If all the impounding reservoirs, storage reservoirs, and distribution reservoirs in the New York City system were filled to capacity . . . the Pine Barrens aquifer would still contain thirty times as much water. So little of this water is used that it can be said to be untapped . . . and, in the language of a hydrological report on the Pine Barrens prepared in 1966 for the United States Geological Survey, 'it can be expected to be bacterially sterile, odorless, clear, its chemical purity approaches that of uncontaminated rainwater or melted glacier ice.'⁵⁰

Ground water in southern New Jersey has long been viewed as a possible source for water supply. However, the development of this source for the populated areas of northern New Jersey has been retarded by political opposition within the source area as well as serious doubts as to the effect such development might have on the rivers and the estuaries below. Indeed, the uncertainty as to ecological impact has been one of the factors in the emergence of more recent political opposition to withdrawing from the Pine Barrens.

50. John McPhee, The Pine Barrens (New York, 1967), p. 14.

Development of South Jersey ground water in the area cited for SJ-1 would have virtually no impact upon recreation, power, and navigation activities in the affected area. Nor would there be any gains or losses with respect to flood control, which is now no problem, because the rivers there are very stable, water does not run off at a very high rate, and there is relatively little development along the rivers anyway. Neither would irrigation requirements appear to suffer. The cranberry bogs would still have an adequate supply of water, and with an annual rainfall of some 38 inches there is sufficient water for spray irrigation at truck farms (all located above the fall line) which are supplied by their own individual wells and which seek no alternative to the present arrangements.

On the negative side water quality could be threatened, with resulting adverse implications for fish and wildlife as well as the ecology of the Pine Barrens and the estuary of the Delaware River. The coastal pine thicket in southern New Jersey constitutes one of the most unusual ecosystems in the northeast United States, in many ways it is unique. The often unusual plant life in the Pine Barrens depends upon ground water for its survival. Ecologists have argued strongly that the Pines and the unique combination of plants in the area could not survive if deprived of adequate ground water. The area under discussion is approximately 2,350 square miles, according to some experts withdrawal of 400 mgd (as involved under project SJ-2 while SJ-1 involves only 200 mgd),

accounting for natural recharge, would in effect remove one-sixth of the water presently available to indigenous plant life.

In addition to possible damage to the ecology of the Pine Barrens, miles of very productive salt marshes which are fed by the rivers in the area could also be adversely affected. Withdrawal of water from the streams could also change the water quality in the estuaries from the normal brackish state to one of oversalinity.

Withdrawal of 200 mgd from the stream system might affect saline intrusion, but apparently not too seriously. Even if withdrawals up to 400 mgd could, with great care, be handled in such a way as to avoid difficulty, salt water intrusion could be viewed as a possible problem in the future. Thus, it would be critically important to provide for sufficient recharge.

The Great Bay, one of the most interesting natural areas on the coast, is presently a highly productive fishing and shellfish area. If not too saline, the shallow marshes are highly productive, with too much salt water intrusion, their yield would be seriously reduced. It will be necessary to ascertain exactly how much water can be taken from a given square mile without adverse affects. Also, research must provide answers about what the reductions of ground water outflow (into the sea) would do to offshore animal life. It will be incumbent upon potential developers to demonstrate that effective controls can in fact be implemented in any future ground water development in the region.

In regard to fish and wildlife, and the ecology generally, there are two real and known possible dangers: the effect of salt water penetration on the aquifers, and the impact of reduced fresh water flows on the ecology of the estuary. In addition, the two possibly dangerous consequences remain to be studied. the impact upon trees and shrubs in the Pine Barrens and the possible adverse influence on offshore aquatic life. Strong guarantees will have to be given against such potentialities, and they will have to be supported by respected ecologists if there is any chance of overcoming anticipated opposition to the development of ground water in South Jersey.

Even if satisfactory guarantees against ecological damage can be produced, strong local resistance can be anticipated, rooted in part in local development considerations. Although relatively sparsely populated at present, this area of New Jersey is expected to grow significantly in the future. South Jersey leaders consider water resources in the area to be theirs and will raise vocal objections to any plans to build a pipeline to transport locally tapped water 30 miles to the north. While the greatest opposition can be expected from the Mullica River area to the Pine Barrens (the best source area), stiff resistance against the development of other tracts further north is also assured.

The key argument made by South Jerseyans is that to the extent the local resources are developed for use outside the area, it is that much harder for local development to proceed without endangering water quality and the ecology locally. If local development occurred at the

same time that water was exported to the northern part of the state, more serious hydrological problems could arise and political resistance would obviously be more acute. Surface water quality is important for certain types of activities in South Jersey, notably cranberry growing, and saline intrusion would be less likely to occur if the water were used locally than if it were exported because it would be returned for recharge in the area of withdrawal.

Delaware River Development

While each of the listed Delaware projects has its own special characteristics, all have the following three institutional factors in common: conflicting interest in the Delaware basin on the part of different jurisdictions, the role of the Delaware River Basin Commission, and controversies around the Tocks Island dam project.

Conflicting Interests in the Delaware Basin. The water resources of the Delaware basin are fundamental to the well-being of over 21 million people. The river's service area embraces four major metropolitan areas in four states and includes about 13 percent of the United States population. As Roscoe Martin has written, "almost nowhere is a community less an island unto itself than in the valley of the Delaware."⁵¹ The 1960 Syracuse report on the Delaware stated well how a river can mean different things to different people.

⁵¹. Roscoe C. Martin, Metropolis in Transition (HHSA Washington, 1963), p. 116.

To the residents of metropolitan New York, there are not many things more important than an adequate supply of good water. The maintenance of such supply has sent the city to the Delaware River . . . for what shortly will be a good half of its water requirements. To Margaretville, on the East Branch of the Delaware high in the Catskills, water means trout fishing and tourism, and its people are wary of any actions that might change the character of their mountain streams. To Easton, the problem of too much water is a recurrent one; a basic concern there is to control the river and so to avoid its excesses. Trenton has a primary interest in the maintenance of low flow at a reasonable minimum, lest its industries languish for want of water. To Philadelphia, the main problem is one of water quality; enough water flows past the city to serve its needs, but in the past it has sometimes been water of unsatisfactory quality and could become so again. Wilmington's interest in water arises principally from the fact that its present source of supply threatens soon to become inadequate in the face of its rapidly growing needs, though its concern for quality control is scarcely less important.⁵²

Within New Jersey itself there are diverse interests in the Delaware as in water supply undertakings generally. A variety of nonurban interests become directly affected by proposals to divert Delaware water for use in the New York metropolitan area. Solutions must be acceptable to statewide rather than merely municipal or even regional interests. As noted in a previous report, while northern New Jersey urban areas look to the Delaware for water supply needs, the state has a dual interest: "From the point of view of state officials (in the later 1950's), the Delaware was an eventual source of water for northern New Jersey, but even more important was a requirement for sufficient Delaware water to maintain stream flows central to industrial development in the Trenton and Camden areas."⁵³

52. Roscoe C. Martin, et. al., River Basin Administration and the Delaware (Syracuse, 1960), pp. 4-5.

53. Institute of Public Administration, Intergovernmental Responsibilities for Water Supply and Sewage Disposal in Metropolitan Areas, a report prepared for the Advisory Commission on Intergovernmental Relations (1962).

The Role of the Delaware River Basin Commission. Although New Jersey officials fully expected to utilize 300 mgd of Delaware River water in their water supply plans, authority to grant such a diversion rests with the DRBC. The idea for such a diversion was first expressed publicly in a message of Governor Hughes three or four years ago, but formally the proposal has not advanced further since that time. As of late 1970, no official letter to the DRBC was received. New Jersey would first have to submit a rough plan for review and consideration for inclusion in the comprehensive plan. Later, formal application would have to be made for a "3.8 review,"⁵⁴ in which the proposal is evaluated against the provisions of the comprehensive plan.

Delaware River Diversion:
Floodskimming to Round Valley

In this project water would be diverted each year during six months of high runoff and stored in Round Valley instead of at Tocks Island. The project would operate to provide New Jersey 100 mgd in addition to that available through the Delaware and Raritan Canal, even before Tocks Island was completed. Arrangements would be included for returning compensation water to the Delaware River during the dry season.

This project would have very little impact of any kind upon the area, and gains and losses in terms of other uses are insignificant. Only one-third of the amount of flow involved in projects P-3 and D-2 is at issue here, and therefore the impact upon recreation, flood control and even ecology would be relatively slight. Irrigation, navigation and local development interests would in no way be affected in any case. As for

54. The "3.8 review" refers to a section of the DRBC compact.

water quality, the project calls for a loss of some 100 mgd during periods of high flow on the Delaware and a gain of 40 mgd during low flow periods. The water quality impacts would either balance out or, possibly, be slightly beneficial.

Technically, no withdrawals are permitted by the Supreme Court decree until additional storage is provided. It is expected, though, that if construction is under way with New Jersey's participation, the court would find substantial compliance with its order and allow the withdrawal of 100 mgd before Tocks Island is completed.

It should also be recalled that this project and the state's plans for the Confluence Reservoir (R-2) are mutually exclusive, which might raise problems with the Division of Water Policy and Supply.

Hudson-Ramapo Diversion

Under this project, Hudson River water would be diverted through the Ramapo River to supplement the Wanaque supply of the NJDWSC, and might be used in Orange and Rockland Counties in New York. The project would include an intake and pumping station at West Park, New York (opposite Hyde Park), a 31-mile long aqueduct to the headwaters of the Ramapo River at Harri-man, a pumping station at Pompton Lakes, and a force main to Wanaque Reservoir. The filter plant proposed at Wanaque would have to be enlarged to take care of the greater output. Except for seven miles of tunnel under Newburgh, the West Park-Harri-man Aqueduct could be cut-and-cover construction.

Development of this project would have no significant impact on such other uses as irrigation, power and navigation and would have negligible impact on environmental quality and aesthetics and local development. Despite limited improvements arising from increased flows, the impact upon ecological values would be minimal. Whatever changes were introduced with

respect to fish and wildlife could be negative because the project involves transferring potentially poorer quality water into the Ramapo.

The Ramapo is used for canoeing at the present time, so recreational benefits can be anticipated through development of this project because of the increased flow that would result.

With respect to distribution systems, this project has been cited by officials at the Division of Water Policy and Supply as depending upon consideration of planning for distributing the water. If 400 mgd were brought in to Great Notch, for example, a distribution problem of considerable magnitude would be created. Some water would have to be transported west, some south; and a loop (tunnel or pipeline) constituting a single distribution system would have to be constructed in place of 10 separate systems, in all, a very costly undertaking.

SUMMARY

New Jersey water supply planning, development and distribution is carried out principally by numerous private and public water companies. There are several large utilities which dominate the scene. Priority has traditionally been given in source development to keeping the water prices down, and to constructing the least expensive and least politically unsettling local alternatives. Conservation interests have thus far not been very strong. State activities have been limited by lack of finances, and failure to plan or to coordinate suppliers. Although a regional water supply authority has been in operation-- the New Jersey District Water

Supply Commission-- it has been unable to compete with low prices of the smaller utilities.

The major new sources discussed in this chapter include expanding the yield of the Raritan River through full utilization of existing reservoirs; use of South Jersey ground water; use of the Delaware River; and the diversion of some water from the Hudson to New Jersey via the Ramapo River. If ground water were withdrawn, recharge techniques would be needed to prevent serious external effects on the environment. Research on possible side effects of such a project needs to be undertaken. Use of the Delaware or the Hudson Rivers involves interstate action. The DRBC would be an active participant in any decision on the Delaware, and diversion of Hudson water would require agreements with New York State.

Besides the need for new supplies, New Jersey could benefit from developing a network of transfer facilities so that existing water supplies could be more efficiently and effectively managed.

C h a p t e r 4

WATER SUPPLY FOR MASSACHUSETTS

ORGANIZATION FOR WATER SUPPLY

Water supply organization in Massachusetts has taken two distinct forms. On the one hand, the Metropolitan District Commission (MDC), a regional organization, constructs facilities and wholesales water to utilities in the Boston metropolitan area and other selected communities. In 1965 the MDC supplied about 42 percent of the water consumed in Massachusetts. In other parts of the state, construction and maintenance of water supply facilities are the responsibility of local government. In both cases the state legislature holds final authority to allocate water and assure the proper functioning of water supply operations. While state administrative agencies have played an influential role in allocating water, comprehensive planning or management of water resources by the state government has not been authorized.

The Metropolitan District Commission

The MDC is an agency of the state with power to issue bonds with the approval of the legislature. Although its operations are financed by its water-using communities, all of its activities-- including financial management-- legally are governed by the legislature as a whole. The MDC is charged by legislation to provide water to every community within 10 miles of the state house and is empowered to supply communities within a 15-mile radius. In addition, the MDC serves several communities outside

of the Boston metropolitan area, under special legislation. In all, there are now 31 member communities, of which 25 draw their entire water supply from the MDC.

The massive Quabbin Reservoir, which was constructed in the 1930's, provided a yield of such magnitude that no new major additions to the MDC's supply were needed until recently. The MDC, therefore, does not have a history of problems or political battles associated with selecting and constructing major water supply projects. With adequate supplies at low rates, the Massachusetts Water Users Association-- an advisory committee to the legislature comprised of representatives from MDC member communities-- has had little concern about its limited power vis-a-vis the MDC. The operating deficit suffered by the MDC has been regularly financed by bond issues approved by the legislature; at the present time 44 percent of the total long-term debt consists of such bonds.

Recently, however, the MDC has begun to face rising pressures on all of these fronts. Its first proposed major addition to the water supply system in 30 years-- the Connecticut River diversions at Northfield-- has encountered public resistance. Requests for authority to finance the project were delayed and questions have been raised in the legislature concerning the practice of financing the MDC's operating deficit by issuing bonds. And finally, the Massachusetts Water Users Association has opposed the MDC's proposal for a rate increase from \$120 to \$160 per million gallons, arguing that the \$40 increment was arbitrarily determined.

Local Water Supply Development

Outside of the MDC area, water supply is handled at the local level variously by local communities, groups of communities, water supply districts, private utility companies, and self-suppliers. The state's main role has been one of allocating water rights, approving new sources of supply for safety, and resolving disputes which arise between communities.

Local issues in water supply occur on at least two levels. First, within each service area, capital expenditure for new facilities and retail rates are issues of prime importance usually resolved locally. Second, disputes have arisen between and among local communities over sources of supply. For the most part, new sources of water have been sought and attained, however, without great difficulty. Communities petition the Department of Health for substantiation of need and approval for selection of a new source. In the past, interlocal conflict has been limited by a relative abundance of water and observance of the rule of pre-emption of source. The pre-emption rule holds simply that a source already appropriated to the use of a public supplier may not be jointly used by another public supplier without the permission of the first user. All new water rights or changes thereof are granted by the legislature.

The petition for new sources can be challenged by another community. Such local disputes are resolved in the state legislature. For example, when the city of Gloucester attempted to construct an aqueduct across several townships to tap the Ipswich River it met with substantial

opposition from those townships. The dispute eventually found its way into the Joint Committee on Natural Resources where legislators from Ipswich, Beverly and Essex, the townships in question, successfully argued against legislation which would have granted Gloucester the right to use Ipswich water.

State Administration

A number of state agencies possess various powers related to water resources. The state Department of Public Health is important in water supply. Within that department, the Bureau of Environmental Health Engineering, Division of Water Quality Control, is responsible for approving new sources and assuring the safety and "suitability of source" of all public water supply. With the legislature considering water supply primarily a local responsibility, and in the absence of statewide planning for water resources, the bureau has become the primary state regulator in water supply matters. The department has not established formal standards for judging the "suitability of source." It considers each case on its merits. Water rights must be granted and system designs approved without the benefit of a statewide comprehensive plan for water supply and other water resource needs.

The Water Resources Commission is a policy coordination agency. The commission is divided into a Division of Water Resources and a Division of Water Pollution Control, each with its own staff director. The commission itself is a nine-member body of which the commissioner of the Department of Natural Resources is the chairman. There are five other

ex officio members representing the Departments of Public Health, Public Works, Commerce and Development, Agriculture, and the Metropolitan District Commission. In addition there are three citizens appointed at large by the governor.

While the commission is responsible for guiding water resource policy and law based on a multiple purpose perspective-- including agriculture, industry, recreation, wildlife, conservation, domestic consumption, and flood protection, it has no regulatory powers. It is not empowered to compel conformity to plans, to allocate water among competing users; or to implement decisions. Nor does it have supervisory or regulatory power over prices charged or over activities of operating and developing agencies within the state. Its only operating responsibilities are in relationship to the Watershed Protection and Flood Prevention Act (P.L. 566, 83rd Cong., as amended) in conjunction with the Soil Conservation Service. It is not staffed or funded to undertake the broad planning responsibilities with which it is legally charged.

Massachusetts political leaders and administrators-- concerned about the efficient use of the state's water resources and sensitive to the growing needs for water supply-- tend to support a shift upward from local responsibility for construction, and in some cases operation, of water supply facilities. However, there are disagreements as to the desirability of expanding regional or statewide activities.

There is very limited expressed support in the state for a federal construction role. There is no question that federal financial assistance

in water supply development would be almost unanimously welcomed at the state and local levels, but many harbor doubts about "strings" that would be attached thereto. Opinions on this question are diverse and wide ranging. Many legislators feel that water supply is properly a state and local function and has no place for federal involvement. Some favor federal construction of water supply facilities which would then be turned over to state or regional authorities for operation. The general sentiment of officials interviewed, however, was that in most cases, if federal control were involved in construction and operation, the price would be too high a trade-off for federal money.

Some opposition to proposals to enlarge the scale of water supply development within the state also exists. Local communities which are prepared to supply their own needs for the near-term future prefer that no change be made. Many communities tend to be suspicious of proposals that they surrender traditional responsibilities and particularly oppose sweeping revision which would have them surrender their water supply facilities to a higher agency.

While the search for funds is pressing at the local level, most communities covet the possession of independent water supply systems and will surrender that independence only where the need is critical or the economic benefit substantial. When outside assistance is desired, communities appear to prefer a wholesaling arrangement which allows them to maintain local control of distribution, retail sales, and possibly traditional sources of supply.

In general, what little active support there is in the state at the present time for larger scale water supply development is divided between those who favor an intrastate regional approach and those who are inclined toward a statewide approach.

Legislative support for any major regionalization will be difficult to obtain. Historically, the state legislature has been reluctant to surrender any portion of its water supply authority to an administrative agency. Moreover, many legislators are not enthusiastic about any new "planning." The proliferation of planning agencies supported by the state, overlapping planning studies, and a gap between planning and action have reinforced this attitude. The conviction remains strong in the legislature that water supply is a matter of local concern and should, therefore, be left to local governments. Geographical issues in water supply hold legislative interest. Interests from the western part of the state, for example, looking for guarantees against further diversions from the Connecticut River, are fearful of a shift of water power out of the legislature into an administrative agency. They tend to see in such a move not the potential for more comprehensive planning of statewide multipurpose needs-- including those of the Connecticut River Valley-- but rather the danger that the agency will be controlled by forces representing eastern Massachusetts.

Finally, except for the occasional piece of legislation which affects their particular district, legislators have not been intensely interested in questions of water resource management. They are sensitive

to the water needs of their constituents and increasingly responsive to threats of destruction to local natural resources, but as yet most legislators do not see a need for strong statewide action on supply.

Although several attempts in recent years to strengthen the state's administrative role in water resources have been unsuccessful, in 1970 the power of the Water Resources Commission was increased by legislation authorizing it to undertake advance land acquisition of reservoir sites with the approval of the governor and the involved municipality.¹ During the 1969 legislative session, Senator Phillip A. Quinn (Democrat from Worcester) had introduced a stronger bill to increase the power of the Water Resources Commission (Senate No. 759). That bill would have empowered the WRC to review all proposals for acquisitions and appropriations for the use of water within the Commonwealth for water supply, to hold public hearings thereon, and to approve, disapprove, or modify such proposals. The bill was referred to the Committee on Natural Resources and Agriculture of which Senator Quinn was chairman. The bill did not get high priority attention from the executive branch. The committee sent the bill back to the floor with a mildly negative report of "leave to withdraw" and it was routinely voted down.

Another bill, introduced by the Water Resources Commission in 1969, would have given the WRC the power to work with the Department of Public Health to decide whether a community could go outside of its borders

1. Chapter 767 of the Acts of 1970, Commonwealth of Massachusetts.

for water, a power which currently lies with the legislature. It provided that the Department of Public Health would study and advise, but the Water Resources Commission would make the final decision. That bill, as well, received little high level support and was defeated.

A third bill (House No. 540) introduced by Representative John Dolan of Ipswich would have authorized a 10-year program of water resources research, planning, and ground water investigation, along with a \$15 million bond issue to finance such a study. It was also defeated.

Reportedly, the aforementioned obstacles preventing passage of these measures were reinforced by the then pending omnibus reorganization of state administrative machinery which is now in the process of being implemented. Other recent reorganization proposals, as well, have been defeated by the argument that the legislature best wait for the major overhaul in administrative structure before making further changes.

It is clear from these experiences that key water issues respecting the allocation of water, regionalization of systems, and administrative approaches for planning and management, ultimately will be resolved in the political-legal arena. The following section discusses important characteristics of Massachusetts relevant to this arena.

THE LEGAL AND GOVERNMENTAL ENVIRONMENT

Historically, what legal power the state exercised in the field of water supply has been vested primarily in the legislature as the result of two factors. First, the state constitution explicitly grants the legislature such power. Article XLIX states:

The conservation, development and utilization of the agricultural, mineral, forest, water and other natural resources of the Commonwealth are public uses, and the general court [the legislature] shall have power to provide for the taking, upon just payment therefor, of lands and easements therein, including water and mineral rights, for the purpose of securing and promoting the proper conservation, development, utilization and control thereof and to enact legislation necessary or expedient therefor.

Second, the legislature has been stronger than the executive branch in most areas of state government, including water supply. The governor has been constrained both by institutional devices and prevailing patterns of political influence within the state. In recent years, however, the executive has been assuming a more powerful role. While the traditional division of power in the area of water supply persists, there are indications that the role of the executive will grow in importance relative to that of the legislature.

The Commonwealth's "General Court" consists in a House of 240 representatives and a Senate of 40 members. Legislators receive a salary of \$11,400 per year, a modest expense account, and a more liberal travel allowance. A long standing tradition of "right of free petition"² magnifies the expanding legislative workload keeping the legislature in session virtually year round. Representatives are elected from 170 districts with average constituencies of 22,000 people. Aside from the leadership, House members have virtually no staff and only cramped quarters in the state house.

2. "Free petition" allows any citizen to introduce a bill into the legislature through any representative, which bill must be given hearing, reported out of committee, and be acted upon by the legislature.

Historically, state politics has been strongly influenced by a Boston-"outside" rivalry, an increasingly significant factor for water supply development since the Connecticut River stands as a key alternative source for Boston's future needs. While this rivalry persists, new issues -- such as governmental reorganization and environmental protection-- have stimulated different patterns of coalition.

Massachusetts state government is a maze of administrative units headed by boards and commissions with little responsibility to the chief executive. Although the governor usually maintains right of appointment to most policy-making positions, until recently he was in fact prevented from using this power to effect for two reasons. First, gubernatorial elections were biennial-- itself a limiting factor-- whereas the terms of many administrative positions were for longer periods. A governor usually would inherit appointees from his predecessor while being unable to use the threat of nonreappointment. Second, what appointments the governor was able to make had to be approved by the Executive Council, an eight-member body established by the legislature to protect local interests in the appointment of top state officials.

In recent years, however, many of the impediments to the exercise of gubernatorial power have gradually been eliminated. In 1964 the League of Women Voters led a successful drive to reduce the size of the Executive Council to five members and to limit its power to the approval of judicial officials and some semi-judicial state positions. In the same year, the governor's term of office was extended to four years, while

legislators continued to be elected to two-year terms. Moreover, the current administration has won legislative approval for an omnibus reorganization of the state's administrative structure. The first phase of the plan went into effect in June 1971, creating 10 secretariats under which all administrative units will be functionally grouped. The secretariats will have no direct administrative control over the units designated to fall within their functional area, but will explore ways in which a coherent, effectively controlled executive office could be established. Legislation for de facto reorganization of administrative power must then be approved by the legislature. The present administration is faced with an opposition party in firm control of both houses of the legislature.

In summary, the legal and political framework in Massachusetts is such that the state legislature is the key channel for implementation of any major water supply projects of regional impact, as well as of most of the significant organizational alternatives for regionalizing water supply administration.

OPPORTUNITIES FOR AND OBSTACLES TO REGIONAL WATER SUPPLY ORGANIZATION

Water supply demand projections will necessitate project development on a scale requiring a broader geographical focus than provided by current water supply administration in Massachusetts. The projects listed by NEWS as alternatives in 1990 are regional in the sense that each is intended to serve a group of communities. On the one hand, the

communities currently served by the Metropolitan District Commission (with additions) are envisioned as a service area to be supplied by either of two new sources-- the Connecticut or the Merrimack Rivers. On the other hand, the rest of the state, which to date has relied primarily on local independent development, could be divided into four water supply regions:

1. The communities of the Ipswich River Watershed could be served either by a 15 mgd development of the Ipswich River or a 15 mgd diversion from the Merrimack River (which would be accomplished as part of a larger Merrimack diversion).

2. Northern Essex and northern Middlesex Counties could be provided with 35 mgd from the Merrimack River.

3. North Plymouth County could be served by either a 12 mgd development of the North River or a 12 mgd diversion of ground water from south Plymouth County.

4. The communities of Bristol County could be served by a 25 mgd development of the Copicut Reservoir, a 25 mgd augmentation of the Lakeville ponds, or a 28 mgd diversion of ground water from south Plymouth County.

Currently, only the MDC communities are appropriately organized to proceed with the projects outlined in the engineering study. New institutional arrangements would be required to carry out projects proposed for the other four regions. The projects illustrated in the engineering study are not likely to be built under existing arrangements.

Regional development of the Connecticut and the Merrimack Rivers is important. And it must accommodate three types of opposition. First, for each river, there is opposition to projects for 1990 because of the potential environmental harm they might cause. Second, the projects are opposed as forerunners of larger and potentially still more damaging

projects to meet projected 2020 demands. Third, the projects for each river are opposed on the basis that alternative means of water supply should be developed including desalination, waste water reclamation, or conventional development of an alternative river.

Looking to longer range needs, we find pressure for regionalization even greater. According to engineering projections, by 2020 the enlarged MDC service area will require major withdrawals of up to 500 mgd from the Merrimack and/or the Connecticut Rivers in addition to alternatives cited to meet 1990 demand. The Ipswich and North Plymouth County areas also will be faced with a choice between those two sources, implying a possible association with the MDC service area. Bristol County could also be looking toward the Connecticut or the Merrimack Rivers. In sum, if conventional methods continue to be used and the demand estimates prove to be accurate, then the whole of eastern Massachusetts could well be tapping a common source, or sources, implying the likely desirability of a common developmental approach for the entire area.

While in-state interbasin transfers will become more extensive, it may not be necessary that Massachusetts residents import or export additional water supply through 2020. One interstate transfer cited in the draft engineering study was the Taunton River Estuary Dam, a 97 mgd development within Massachusetts of which 47 mgd would be exported to Rhode Island. (Some Connecticut officials also have suggested the possibility that parts of northern Connecticut be served from the Quabbin Reservoir, but such a project was not included in the NEWS engineering report.) The only other

significant interstate development suggested in the engineering study is Merrimack upstream reservoir construction in New Hampshire. Subsequent to the written draft report, the Corps of Engineers added a Merrimack "floodskimming" project which may not require flow regulation reservoirs. However, it may require substantial advanced waste treatment within New Hampshire, as well as above the water supply intake point in Massachusetts. The scale of treatment required, and the extent to which organizational coordination between upstream waste treatment and downstream water intake is desirable, will determine the need and influence the likelihood that an interstate and/or federal arrangement will be necessary for that project.

Competing demands for water resources are on the rise in Massachusetts and will have major impact on the legal, organizational and economic feasibility of alternative supply projects. Affluence, more leisure time, a growing interest in the out-of-doors for recreation and education, and concern over environmental deterioration have all contributed to the increased demands placed on water resources in Massachusetts.

In the long-term, the process of allocating water resources in Massachusetts could be significantly affected by the political potency of the environmental issue, the growing influence of environmental groups, and the emergence of conservation commissions as a formal, public force for environmental protection on the local level.

In his January 7, 1970 address to the state legislature, Governor Francis Sargent proposed that the state spend some \$250 million over an unspecified period of time on environmental improvement.³

Support for environmental protection has also come from the Democratic leadership. Speaker of the House of Representatives, David M. Bartley, in the spring of 1970 introduced legislation establishing a study commission to explore the desirability of a permanent public organization to monitor development in the Connecticut River Valley (House No. 2714). In sponsoring this bill, Speaker Bartley, who represents the Connecticut River Valley City of Holyoke, noted that the valley

. . . is still damaged daily by pollution, exploitation and disregard for its outstanding qualities. Due to the magnitude of the river basin and its seemingly limitless bounties, these acts of ignorance have generally gone unchallenged until recently. However, present signs and future forecasts make further inaction impermissible.⁴

The protection of natural areas increasingly has become a pre-occupation of urban-- and particularly suburban-- residents. Growing use of the state's rivers, lakes, and estuaries has coincided with the depletion of natural areas as the result of population and economic growth and liberal land use practices.

3. The governor himself once was commissioner of natural resources and has drawn upon former holders of key state positions in the environmental field for his current staff.

4. General letter from Speaker David M. Bartley, State House, Boston, December 19, 1969.

Conservation organizations, such as the Massachusetts Audubon Society, welcome new enthusiasm for causes they have long supported. Newer organizations, such as the Connecticut River Watershed Council, have organized along specific geographical lines but with broad conservation aims. In addition, civic action organizations, such as the League of Women Voters, have taken an active interest in issues of environmental quality.

Proliferation of small groups, some created in response to a specific threat to a nearby natural area, is also occurring. For example, ad hoc citizens' groups were formed to oppose use of the North River for waste discharge, while student action organizations have been created in Cambridge and central Massachusetts to protest "environmental abuse."

Despite the existence of several, loosely fashioned confederations, the numerous organizations and ad hoc groups still are fragmented, as well as far from unanimous on specific issues. The creation of a reservoir for water skiers or motorboat enthusiasts, for example, is anathema to stream trout fishermen, canoeists, and many hikers and campers. Moreover, most of these organizations are still primarily avocational in nature, and as such, have yet to achieve a level of commitment and effectiveness more often characteristic of the pursuit of vocational interests.

While unity among environmental groups in Massachusetts is far less evident than in neighboring Rhode Island, some efforts nevertheless

are being made to provide the professional expertise and coordination necessary for effective action. For example, the Massachusetts Audubon Society, with financial assistance from the Ford Foundation, established a "Conservation Service Center" in 1966, "to build public awareness, interest and support of conservation issues-- both moral and financial."⁵

The center explains its purpose as the following:

Too often in our highly competitive world conservation forces go unheard because they are not trained as communicators nor have the necessary time to devote to this phase of action. The Center is designated to provide the much needed professional help in 'getting the message through.' A pool of professional talent, trained to communicate ideas and information on conservation issues is available to help groups, clubs, and individuals upon request.⁶

Despite the obstacles to unified action, environmental groups in Massachusetts on occasion have proved capable of persistent, vocal action toward a common end. For example, support of the Wetlands Act several years ago was sustained, articulate and virtually unanimous.

A second constraint on the effectiveness of the environmental movement is both legal and financial. To date, the lifeblood of conservation organizations has been tax exempt contributions. As nonprofit, tax exempt organizations, conservation groups are prevented by federal law from engaging any substantial proportion of their resources in political activities. Their information-oriented activity can, however,

5. Information Bulletin printed by the Conservation Service Center, South Great Road, Lincoln, Massachusetts.

6. Ibid.

have significant influence. The incisive position papers put out by the Connecticut River Watershed Council, for example, address themselves directly to the issues of potential harm threatened by proposed projects. The Massachusetts Audubon Society supports an active program of professional publications which both educate potential supporters and advocate positions. The Essex County Greenbelt Association has an active membership which keeps abreast of developments through the organization but exercises influence as private, nonassociated individuals. And finally, the Massachusetts Forest and Parks Association has been one of the most politically effective conservation groups in the state. Comprised of a nucleus of members which splintered from the Audubon Society, the association does not claim tax exemption, and therefore, is free to engage in political activity. In this capacity it is the only conservation group in the state which sponsors a duly registered legislative lobbyist.

Conservation commissions are beginning to give formal structure to some of these forces. The concept of a local "conservation commission" developed in the Ipswich River Basin as a response to proposed "drain and fill" operations which would have destroyed a nearby natural marshland. Residents of the town of Ipswich successfully opposed the project and followed up their victory by supporting legislation empowering any town or municipality in Massachusetts to protect local natural resources primarily through land acquisition.

Legislation for the creation of conservation commissions was passed in 1957 and, with the support of the Department of Natural Resources,

commissions began to appear across the Commonwealth. The first was created in communities of suburban Boston, bringing together people with a general interest in environmental issues. By 1969, 275 of the state's 351 towns had commissions, including communities which collectively represented more than 80 percent of Massachusetts non-Boston population.⁷

The Massachusetts legislature allocates approximately \$1 million annually-- matched by local governments-- to support the state Self-Help Program for local conservation commissions. A 1969 evaluation of the movement estimated that about 45 percent of the commissions were "active," 25 percent "mildly active," 15 percent "newly established," 10 percent "very active" and 5 percent "inactive."⁸

Legal and Organizational Factors
Associated With Illustrative Project Alternatives

Connecticut River Water for Eastern Massachusetts

Five out of seven projects cited in the NEWS draft engineering report as possible means of further developing the water resources of the Connecticut River Basin for supply would divert water out of the Connecticut basin, primarily for use in eastern Massachusetts. The other two projects, the Knightville and the Connecticut River mainstem-- are alternatives to add 40 mgd to the supplies of the lower Connecticut River Valley in Massachusetts by the year 2020. These two projects would develop

7. Andrew J. W. Schelley, Conservation Commissions in Massachusetts (Conservation Foundation: Washington, D. C., 1969), p. 34.

8. Ibid., p. 145.

Connecticut River water for in-basin use and hence, assuming the return of treated water to the river, no significant change in overall flows would result thereby.

In separate discussions of these two types of projects, attention will be focused on features and potential problems unique to each project, as well as the problems common to each of them.

Precedent. Current proposals to further develop the waters of the Connecticut River Basin to supply eastern Massachusetts are extensions of a general movement which began over a century ago. In the early 19th century, Boston was compelled to look beyond its borders for additional water supply and for reasons of geographical and political configuration, turned westward. In 1846 the state legislature authorized the city to construct its first public supply system by diverting from Lake Cochituate in the Merrimack River Basin. Additional supplies were developed in the Sudbury River Watershed in 1878.

By the latter part of the century the growing Boston metropolitan area had spread well beyond the borders of the city so that additional problems of administration complicated the search for new sources of water. Persistent water shortages finally precipitated further action at the state level. In 1893 legislation was passed directing the state Board of Health to undertake a comprehensive review of the metropolitan area's water needs. The subsequent two-year study and report resulted in the creation of a Metropolitan Water District in 1895, comprised of 20 cities and towns, and construction of the Wachusett

Reservoir-- completed in 1906-- in the Merrimack River Basin. The study also predicted further rapid growth of the Boston area and envisioned future development of the Connecticut River Basin within Massachusetts as preferable to potential out-of-state sites to the north.

In 1926 the legislature created the Metropolitan District Water Supply Commission-- which later became the Water Supply Division of the Metropolitan District Commission-- to develop the Quabbin Reservoir in the Ware and Swift River Watersheds. Both of these river systems feed into the Chicopee River which in turn is a tributary of the Connecticut River. Thus, over the objections of the state of Connecticut (which are discussed later), the first diversions from the Connecticut River Basin to eastern Massachusetts were achieved.

Since development of Quabbin, the service area of the Metropolitan District Commission has expanded beyond the limits of metropolitan Boston to include Worcester, South Hadley, First District No. 1, Wilbraham, Chicopee and, by a 1966 agreement for emergency use, Springfield.

Current out-of-basin diversions from the Connecticut River total about 190 mgd, which is stored in Quabbin before delivery to MDC users. About 30 mgd of this amount is returned to the watershed as a legal release.

Current Events. In its most recent search for additional supplies, the MDC area faced a choice between two major conventional sources the Merrimack and the Connecticut Rivers. Since only about one-half of

Quabbin storage capacity currently can be utilized via the immediate watershed, the MDC turned again to the Connecticut River as the cheapest and most abundant source to meet immediate and near-future demand. The legal procedures and political obstacles encountered in this effort are relevant to most alternatives for Connecticut River diversions to eastern Massachusetts.

In recent years the MDC, with legislative authorization, has been attempting to negotiate agreement with the Northeast Utilities Company on a plan to use the latter's new power facilities in Northfield Mountain to divert water to Quabbin. The first authority for diversions via Northfield Mountain was passed in 1966. The negotiations have stalled reportedly due to two major points of disagreement. First, Northeast Utilities desires to be absolved of liability for possible despoilation of Quabbin and/or damage caused by foul or unsafe water released from its facilities. Second, Northeast Utilities has maintained that future disputes between the company and the MDC should be settled by arbitration. Apparently, the MDC has not acceded to these points owing to rulings by the attorney general that a public agency of the state cannot legally agree to such conditions.

During the 1969 legislative session two bills were introduced into the legislature giving the MDC power to itself carry out diversions from the Connecticut River. Senate No. 1944 would have provided "additional funds for the Metropolitan District Commission for extending and further developing its sources of water supply by diverting waters of the Connecticut River into Quabbin Reservoir." House No. 128 would have empowered the

Metropolitan District Commission to divert water from the Connecticut into Quabbin Reservoir. Both bills were referred to the Joint House-Senate Committee on Urban Affairs which combined them to produce, in April 1969, Senate No. 1331, which had several important provisions. It authorized the MDC to

1. Use any previously authorized but unexpended funds, plus \$20 million, on necessary projects.

2. Undertake diversions to the Quabbin Reservoir "from a suitable point on said Connecticut River or elsewhere."

3. Expend up to \$35 million in carrying out the Connecticut River diversions.

4. "Enter into such agreements with any public agencies or any private person, group of persons, or corporation . . . as, in its opinion, are necessary or desirable to secure and effect the diversion of waters of the Connecticut River and the storage, pumping and transmission of the same into the aforesaid Quabbin Reservoir."

5. Finally, the bill provided that "no water shall be so diverted on any day when the flow of water in the Connecticut River as measured by the gauge maintained by the United States Department of the Interior Geological Survey . . . is less than seventeen thousand cubic feet per second."

As it turned out, the broad powers granted the MDC in Senate No. 1331 stirred the opposition of other Connecticut River users. State representatives from the Connecticut River Valley easily won legislative support to delay the bill in order to study the implications and potential effects of the proposed Connecticut diversions before definitive action by the General Court. In accordance with their wishes, the legislature approved in August 1969, a resolve "providing for an investigation and study by a special commission relative to providing additional funds for the

Metropolitan District Commission for extending and further developing its sources of water supply, and relative to diverting water of the Connecticut River into Quabbin Reservoir."⁹

A series of public hearings held by the commission have given expression to the fears of numerous groups in the valley of the harm they could suffer as a result of the Northfield diversions or future, even more damaging, withdrawals.

Opponents to the Connecticut diversions cite the following factors:

1. Loss of potential water supply for both domestic and industrial needs in the valley.

2. Fear of lower flows which would intensify pollution and require costlier sewage treatment.

3. Depletion of the soil through loss of periodic flooding

4. Ecological damage to the river through:

- a. Insufficient flows which could harm fish (possibly through higher temperatures) and alter plant life both in the river and in the estuary.

- b. Loss of some "flushing action" of flooding which has an undetermined effect on the river's vitality.

- c. Intensification of pollution.

5. Loss of recreational and aesthetic values.

9. Resolves, 1969, Chapter 100. The commission was to consist of three members of the Senate, five members of the House of Representatives, the commissioner of the Metropolitan District Commission or his designee, the commissioner of the Department of Natural Resources or his designee, and five persons to be appointed by the governor.

6. Reluctance to surrender what is considered to be "rightful" property without due reciprocity, especially in light of traditional rivalry with eastern Massachusetts and the existence of other untapped resources (e.g., the Merrimack and desalination).

7. The fear of radioactive waste from the atomic power plant at Vernon, Vermont. This fear is naturally of greatest concern to potential users in eastern Massachusetts. While many of the proponents of the Northfield project claim the charge is nothing but a red herring introduced by the project's opponents-- and, indeed, the charge was originally raised by nonconsumers in the Connecticut valley who opposed the project for other reasons-- still, until the public is satisfied that there is no danger, this issue is more likely than any other to delay or prevent construction of the project.

In-Basin Users. Most of the original opposition to the Northfield project came from residents within the Connecticut River Valley. The Springfield Conservation Commission played an active role in mustering opposition both in Massachusetts and within the river basin in Connecticut. The commission challenges the notion that flows in excess of 17,000 cfs are necessarily "waste" and suggests that such high flows may in fact be a vital stage in the river's rejuvenation. Still of primary concern to the Springfield commission is the possibility that the Northfield project will set a precedent soon to be followed by more massive Connecticut withdrawals to serve eastern Massachusetts.¹⁰

10. Chairman, Springfield Conservation Commission, March 17, 1970.

The Springfield city government has taken an active position in opposing the Northfield project and future Connecticut diversions. The City Council passed a resolution on April 21, 1969 opposing Senate No. 1144 and House No. 128 (both of which subsequently were combined into Senate No. 1331) and any future bill which would authorize the Metropolitan District Commission to withdraw water from the Connecticut River.

Industrial interests in the Springfield area have voiced concern that future industrial growth will be impeded by lack of adequate supply. Some who claim to speak for these interests cite the loss of the textile industry, the waning of the shoe industry, and the financial constraints of the Springfield city government as indications that the area "needs all the resources it has," and admonishes the Metropolitan District Commission to look "closer to home" for its water supply.¹¹

Most of the other conservation commissions in the Springfield area also have taken stands in opposition to the Northfield project and any future diversions. A conglomerate of these groups, the Hampden County Association of Conservation Commissions, has attempted to organize and unify areawide support in opposition to Connecticut River diversions.

A private conservation group centered in the Springfield area, the Connecticut River Improvement Clearinghouse, has indicated that it is not opposed to diversions from the Connecticut per se, but feels that

11. Public Hearings at Northampton, Massachusetts, held on February 26, 1970 by the Governor's Commission to Study the Proposed Northfield Diversions and Other Matters.

inadequate attention has been given to the possible side effects of the Northfield project. In particular, the groups cites the need for a comprehensive view of the environmental impact of diversions including possible ecological harm to the river and future downstream needs for water supply, as well as water supply needs for out-of-basin users.

The prevailing sentiment among groups and individuals within the Connecticut River Valley, aside from some elements which are emotionally and unalterably opposed to out-of-basin use of the river, is one of extreme caution. First, there has been uncertainty as to what effect the Northfield diversions would have. As long as there is uncertainty, and until the facts are more clearly explained, the feeling is that it is better to oppose strenuously now rather than be sorry later. As the facts emerge about the real potential effects of the Northfield diversions-- including a clearer picture of what is known and what is not known-- opposition to Northfield in and of itself has tended to wane. Despite growing assurance and agreement that the project is likely not to have deleterious side effects, the feeling persists that the Northfield project will lead to larger, more damaging diversions in the future. The long standing rivalry between the western and eastern parts of the state has served to exacerbate natural concerns and obscure an already complex set of problems.

Since the final decision on the Northfield project will be made by the legislature, local representatives from the Connecticut River Valley are shouldered with the responsibility of synthesizing the feelings and

interests of their constituents, as described above, and weighing these against several opposing factors. Those factors appear to be perceived by the legislators as the following. First, Boston needs water. Second, metropolitan area legislators obviously would be willing to take strong action to assure that adequate supplies are provided. Third, most state authorities have indicated that the Northfield project will not deplete future water supplies in the valley and does not appear to have harmful potential. Fourth, it is apparent that future diversions are contemplated and that such future diversions could have undesirable consequences.

The valley area legislators currently appear to have enough voting strength to defeat a bond issue bill-- necessary for Metropolitan District Commission construction-- which requires two-thirds approval. Thus, legislative bargaining will be an important component in ultimate project design if bonding remains an important source of finance.

Statewide and Interstate Organizations. None of the state agencies competent in the water resources field has indicated that any serious consequences are likely to result from the proposed Northfield diversion. Generally, the Water Resources Commission, Department of Natural Resources, and the Department of Health (aside from specific comments which are noted later) have seemed to feel that the Northfield diversion offers a reasonable and safe supply without foreseeable deleterious side effects. Future diversions from the Connecticut, however, remain an unanswered question.

The Connecticut River Watershed Council, a multistate, nonprofit conservation organization, has been one of the most active private groups

involved in the current wide ranging discussion concerning development of the Connecticut River Valley. The council's position on the Northfield project, and more generally on Connecticut River diversions, reflects much of the informed concern being aired:

We have supported the sharing of truly surplus water from the Connecticut River as proposed in the Northfield Mountain pump storage project. However, our support had been conditional upon the authorities recognizing the riparian rights of the valley's communities, industries, and individuals to the waters within the Connecticut River watershed, and that the authorities allow for the return to these waters at such future time as they are needed for water supply. Such waters would be returned directly through the natural water system, or by an expansion of existing service areas by the Boston Metropolitan District Commission. This expansion in addition to covering the Springfield-Holyoke-Chicopee metropolitan area might well extend down into the northern part of Connecticut where water shortages are anticipated to occur around the turn of the century.

Additional conditions include proper monitoring of diversion volumes and reporting to an independent authority such as the New England River Basins Commission. Also, establishing a quid pro quo such as expanding recreation on Quabbin Reservoir in return for the reservoir receiving Connecticut River waters.

We will continue to oppose any diversions until the above conditions are accepted as part of the lawful obligations of the water supply authorities involved.¹²

The League of Women Voters of the four states through which the Connecticut River flows (Connecticut, Massachusetts, New Hampshire, and Vermont) have formed an "Interleague Committee of Women Voters on the Connecticut River" which has been concerned primarily with the development

12. Letter of February 11, 1970 from Ellsworth S. Grant, president of the Connecticut River Watershed Council to Colonel Frank P. Bane, chairman, Connecticut River Basin Coordinating Committee.

of the Connecticut River comprehensive plan. While the committee does not oppose all withdrawals from the Connecticut River, and feels the proposed Northfield diversion could be undertaken without serious side effects, it is opposed to granting the Metropolitan District Commission unrestricted authority to make withdrawals. Moreover, it suggests the necessity of a wider multipurpose perspective in considering the merits of such proposals by granting more authoritative review power to a statewide agency such as the Water Resources Commission.¹³

Legal Dimensions. When diversions from the Connecticut River first were proposed to serve the eastern Massachusetts area in the 1920's the state of Connecticut raised objections similar to those currently being voiced by groups in Massachusetts. The controversy between the two states arose as the result of the Massachusetts legislature's authorization for diversions from the Ware and Swift River Basins into Wachusett Reservoir. Both rivers are tributaries of the Chicopee River which in turn is a tributary of the Connecticut.

In 1930 the state of Connecticut brought suit against the Commonwealth of Massachusetts contesting out-of-basin diversions as a riparian of the Connecticut River.¹⁴ Connecticut argued that the proposed diversions would have the following effects:

- Interfere with navigation.
- Damage agricultural land by diminishing flood flows.

13. Public Hearings at Northampton, Massachusetts, . . . op. cit.

14. 292 U.S. 660 (1930).

- Impair current and potential power production.
- Cause injury to the shad run.
- Lower water quality by reducing flows.

Connecticut also charged that Massachusetts was planning to make additional diversions in the future which could prove harmful to downstream users. And, finally, the state argued that alternate sources-- such as the Merrimack River-- were available to the Boston area.

Massachusetts countered each of these charges. Among other points, the Commonwealth maintained that Connecticut could not prove future diversions were planned, and suggested that the diversion in dispute actually could benefit downstream users by stabilizing river flows.

In analyzing the arguments, the river master heard unofficial comments from the Corps of Engineers to the effect that the proposed diversions would not be harmful. The master concluded the following

- The diversions would affect 2.9 percent of the watershed above Connecticut and reduce flows by 2 percent. About 94 percent of the reduction would occur where the Hartford gauge was above 3.5 feet (a total of 11.5 feet in depth). Therefore, navigation would not be impaired.

- While the loss of flood waters to agricultural lands could have positive and negative effects, there is no clear evidence that significant damage to bay lands would result.

- Current power production would not be impaired.

- Alternate sources proposed by Connecticut for Boston's water supply were of inferior quality and uncertain in yield.

The Supreme Court accepted the river master's findings and ruled against Connecticut. In its judgment the court decided that use of the

riparian doctrine by both states did not require that issues between them be decided on similar grounds.

The burden of Connecticut to sustain the allegations on which it seeks to prevent Massachusetts from making the proposed diversion is much greater than that generally required to be borne by one seeking an injunction in a suit between private parties.

The court concluded:

There has been brought forward no adequate reason for disturbing the Master's findings of fact. They are amply sustained by the evidence and are adopted by the Court.

To date no formal objections have been raised by the state of Connecticut to the proposed Northfield diversions. However, several public agencies and officials have voiced concern over the proposal, and especially over the possibility of future Connecticut diversions.

The city of Hartford has raised questions about the effect of the diversions on future downstream water needs. The Capital Region Planning Agency, which encompasses the Hartford metropolitan area, has asked for clarification of the downstream user needs projected in the NEWS study for the year 2020 (the details of which are referred to later).

The Connecticut Water Resources Commission has indicated that it does not consider the Northfield diversion to be potentially damaging to the water needs of Connecticut, although it is attempting to secure guarantees against future diversions without Connecticut's approval. Opponents of the project within Massachusetts have suggested that while the commission has not officially stated its objections to diversions at Northfield, it is in fact troubled by the prospect.

Most of the public agencies in Connecticut, then, have approached the problems raised by the Northfield diversions analytically. They have examined and questioned data and for the most part have found the Northfield project, as proposed by the MDC, not to be potentially harmful. Their analysis, however, has led to more serious questions about the effect of future Connecticut diversions. These questions will have to be answered factually before the professionals in Connecticut will willingly concur with proposals for withdrawals from the basin in addition to Northfield.

Although there is precedent in the Supreme Court decision of 1931 for withdrawals by Massachusetts from the Connecticut River Basin over the objections of Connecticut, the latter's opposition to future diversions may be more decisive for three reasons.

First, the court ruling was decided with respect to initial diversions from the Connecticut River Basin in 1930. Future diversions would significantly differ in that: (a) the nature of the river has changed, and whether or not it has changed as the result of the initial diversion, additional diversions could produce different effects of a yet undetermined nature and scale; (b) Connecticut's needs for water have increased and hence its future dependence on the Connecticut River is greater; (c) at least one reasonable alternative source-- the Merrimack River-- could supply a large portion of eastern Massachusetts water needs; new technologies may provide additional options; and (d) while the first three changes could strengthen Connecticut's position in opposing future diversions,

Massachusetts water needs also are growing, a fact which could strengthen that state's arguments for additional Connecticut River diversions.

Second, the diversion of water from the Connecticut River Basin is now and will continue to be an internal issue for Massachusetts as well as an interstate issue between Massachusetts and Connecticut. Opponents in Massachusetts already have shown themselves more than ready to claim the support of downstream users in Connecticut to strengthen their cause. To date such an alliance has not developed, but it could produce a potent political opposition to the desires of eastern Massachusetts in the future.

Third, while the centers of authoritative decision in such disputes probably will continue to lie at the state and federal (primarily the Supreme Court) level, interstate groups will play an increasingly important role in influencing those decisions. The New England River Basins Commission, for example, presents a new opportunity for mediation and meaningful negotiation between the two states in resolving disputes without recourse to court action.

Northfield Mountain: Diversion in 1990. This project as described in the draft engineering report, would utilize the facilities of a one million kilowatt pumped storage hydroelectric generating plant at Northfield Mountain, which is presently being constructed by the companies of Northeast Utilities. The new facility is designed to provide peak hour electricity by pumping water from the Connecticut River to a storage pool atop Northfield Mountain during low use hours for release during the daily period of high use. An estimated 1.4 hours of pumping time between the

period of storage pumping and power generation could be used to pump an additional 375 million gallons to the mountaintop pool. This additional storage, accommodated by a four-foot heightening of the pool, would then be released over a 24-hour period to Quabbin Reservoir through an 8.5-mile, 10-foot diameter tunnel.

The water quality of the Connecticut mainstem requires (1) chlorination at the outlet of the pumped storage reservoir, and (2) a 45,000-acre foot detention basin in Quabbin created by dams and dikes in the reservoir to provide up to 30 days for monitoring and additional treatment, if required, before introduction into the main reservoir.

The Northfield to Quabbin facilities would be operated to divert water at the steady rate of 375 mgd through the tunnel. Under the current minimum flow regulation of 15,000 cfs in the Connecticut River at Turners Falls, a daily average of 375 mgd could be withdrawn for about 80 days of the year for an annual average diversion of 82 mgd. The 375 average daily withdrawal-- a rate of about 580 cfs daily, if removed on a steady basis-- would therefore reduce the average daily flow of the river by a maximum of 3.7 percent for about 80 days of each year's high flow period. As the river's flow became greater than 15,000 cfs, the percentage of actual reduction naturally would decrease.

If the minimum flow requirement in the Connecticut River were reduced to 10,000 cfs at Turners Falls, the 375 mgd (or 580 cfs) average daily withdrawal could be made for about 120 days of the year, thereby providing a total average annual diversion of 123 mgd. In this case, the

maximum flow reduction of the river for those approximately 120 days of the year's high flow would be 5.8 percent.

In sum, neither an 82 mgd nor a 123 mgd withdrawal would reduce Connecticut flows by more than 5.8 percent or to an average daily flow of less than 10,000 cfs, and in neither case would flows be reduced at all for more than an average of 120 days of the year. From a purely technical standpoint, this difference is almost unmeasurable over a full day's period. (The United States Geographical Survey calculates that the gauges used to measure Connecticut River flows at Turners Falls are accurate only within 5 percent, a factor only slightly less than the maximum proposed daily average flow reduction.)

Despite the apparently inconsequential size of the proposed diversions, the following important questions still must be answered: What are the future water requirements for downstream use? Will the Connecticut flows after the diversions be sufficient to supply those needs? Will further flow reductions, even as little as 5.8 percent at high flow periods, prevent certain needs from being supplied?

Further analysis along these lines would be an invaluable tool in clarifying the issues associated with flow reductions and systematically evaluating the potential effects. In effect, such analysis should attempt to translate multipurpose and multiobjective needs into specific flow requirements objectively determined and reviewed.

The issue raised in this statement might easily be resolved or at least clarified-- by reference to the assumptions and method of calculating the figures and the data used in those calculations.

Related to the question of aggregate flow reduction is the extent to which alteration of normal fluctuating inflows can affect the river's vitality. Floodskimming and the observance of low flow requirements minimize the potential for exacerbating problems associated with low flows. However, less attention has been given to the possibility that floodskimming of supposed "surplus" water may be robbing the system of periodic surges which play an important role in the river's (or the estuary's) ecosystem.

A major feature of the Northfield project would be the introduction of Connecticut River water for the first time into the Quabbin Reservoir. While the diversions envisioned would represent a small portion of the total Quabbin capacity of approximately 412 billion gallons, the danger still exists of releasing undesirable plant or animal organisms, or other annoying or harmful elements, into the reservoir. The proposed detention process appears to offer a reasonable safeguard against such an occurrence, however, it does not propose to be 100 percent effective.

This project would offer little positive or negative potential for flood control, recreation, irrigation, or navigation. However, use of the river as a major source of water supply might add support to current antipollution efforts.

While protective devices could be used at Northfield to exclude "juvenile" and "adult" fish, the Division of Fisheries and Game indicates that at present, "there appears to be no suitable means for excluding eggs

and larvae in the design of the Northfield diversion facility." The division suggests that it may be possible to prevent this transfer by using "extremely high chlorination" or "electrical killing barriers" in the water treatment facility.¹⁵ It is assumed that the Connecticut River eventually will be upgraded from a Class D to a Class B river quality, which, while an improvement, is still inferior to Quabbin's current Class A status.

The Northfield diversion could provide an additional power benefit. The pool at the top of Northfield Mountain would have to be heightened four feet to accommodate the additional water for Quabbin. During the periods when water supply diversions are not being made, it might be to the advantage of the utility company to utilize the additional capacity to provide a longer period of power generation.

The diversion from Northfield could be accomplished via a tunnel which should not cause any ecological or aesthetic problems, assuming the resultant spoil banks were adequately dealt with.

Tully Dam: 55 mgd in 1990. This project would modify an existing Corps of Engineers flood control project on the Tully River, with a drainage area of 50.4 miles. An operational change would make use of two inches of available capacity to divert during spring freshets. Additional reservoirs would be constructed on small neighboring streams (Priest and Tarbell

15. Letter of March 6, 1970 from James M. Sheppard, director of the Massachusetts Division of Fisheries and Game, to Charles F. Kennedy, director of the Division of Water Resources.

Brooks and the west branch of the Tully River) increasing the controlled drainage area to 104 square miles. Runoff from these impoundments would be pumped to the Tully Reservoir. A total of 55 mgd yield would be diverted to Quabbin Reservoir via a 7.5-mile, eight-foot tunnel.

While the engineering design listed calls for the skimming of spring freshets, the NERBC has indicated that a yield of 55 mgd may, in fact, require more prolonged diversions.

The impoundments of three additional brooks besides the Tully poses the risk of changing some of the streams from trout streams to warmer water systems. The primary trout water damage would occur during the spring of the year when the streams are impounded. An important factor here in limiting potential damage will be the management design of the projects.

The Division of Fisheries and Game has raised objections to the diversions from the west branch of the Tully River and Priest and Tarbell Brooks, fearing the further diminution of free flowing streams. The division has said: "It is our belief that the flow from Priest and Tarbell Brooks should not be removed from the Millers flow above Athol. If we are to achieve the degree of public fishing opportunity projected for the Millers River between South Royalston and Athol, these spring flows will be necessary."¹⁶

It is doubtful that the impoundments would have any effect above the dams on the quality of water which currently is Class A. Some concern

16. Ibid.

has been voiced about the possible negative effects on water quality downstream due to reduced flows. The only potential problem here would be additional reduction of flows during dry periods. The Franklin County Department of Planning, noting that "present low flow during the summer months intensifies any existing pollution problem," has indicated it would "insist on safeguards of adequate flow in the Millers River through Franklin County to prevent intensification of the pollution problem."¹⁷ Thus, if diversions from the Tully project were in fact confined to spring freshets, there would appear to be no water quality problem or opposition on the basis of impaired water quality.

Some years ago the state proposed increasing the height of the Tully Reservoir for recreational purposes. Although that proposal evidently was dropped or put aside, development of Tully for water supply purposes would, under existing regulations for quality control, preclude use of the reservoir as a major recreational area. The degree to which the new pools could be used for contact sports or boating would depend on regulations set by the Department of Health.

Irrigation, power and navigation would not appear to be affected by the project. Except for the Tully Reservoir which is owned by the Corps of Engineers and under lease to the state, the potentially affected territory appears to be primarily privately owned. The scale of opposition

17. Letter of January 14, 1970 from A. Donald Caven, county planner of Franklin County to Charles F. Kennedy, director, Water Resources Commission.

from private landowners would not be apparent until the proposal became more widely publicized. For the most part, however, the territory is relatively undeveloped. Most of the Tully drainage area is in New Hampshire; however, territory or water flows in that state would not be affected.

The impoundments might result in the destruction of some forest area which could be a recreational loss and may raise objections from several conservation groups.

It is possible that the areas through which the three brooks run could be developed into major recreational areas with income potential for the local economy. Evidence to the effect that intermittent impoundments may preclude such development, therefore, could raise objections from local landowners and developers concerned about losing potential income, selectmen reluctant to forego potential taxable development, as well as local conservation commissions.

Hadley Diversion: 125 mgd in 1990. This project would divert from the mainstem of the Connecticut River to Quabbin at an annual rate of 125 mgd. Diversions would be made only when the flow of the river at Turners Falls was above 10,000 cfs. Water would be piped through a 9.8-mile, 10-foot diameter aqueduct to an 11,500-acre foot detention basin in Quabbin which would allow for natural purification and observation.

The potential effects of the Hadley diversion are similar to those of the Northfield project in both scale and character, with two exceptions. First, the Hadley project would require construction of an

intake facility on the mainstem of the Connecticut River which might have minor side effects. On the one hand, the intake could destroy some fish, and on the other hand, the facility itself could detract from the appeal of an otherwise natural area. Methods exist to minimize both of these potentialities.

Second, the Hadley diversion would withdraw from the Connecticut at a point where the water is slightly inferior to that withdrawn at Northfield. Since the diversion would be made from the mainstem of the Connecticut, the issue of radioactive pollution from the Vernon plant again could become a factor.

West Deerfield Diversion: 125 mgd for 1990. This project would involve floodskimming the Deerfield River in the vicinity of West Deerfield, Massachusetts. A diversion weir, pumping station and a 14.2-mile, 10-foot diameter tunnel to Quabbin Reservoir would be required to provide a 125 mgd yield. Because of the quality of the source, disinfection and 30 days' storage in a 34,000-acre foot impounded area of Quabbin Reservoir would be required before introduction into the main system.

The West Deerfield diversion is similar to the Northfield and Hadley proposals in its potential effects. It differs from the Hadley project in offering water of slightly higher quality. It is considerably costlier than Northfield since West Deerfield is substantially further from Quabbin and hence would require more extensive tunneling.

The Deerfield River is strictly regulated by the power companies using the Harriman and Somerset Reservoirs. The New England Power Company,

however, is not regulated in the amount of flows it must maintain in the river. The mean, regulated discharge of the Deerfield River at West Deerfield is 788 mgd (1,221 cfs) from a drainage area of 558 square miles. A further diminution of low flows could have undetermined deleterious effects on fish in the lower Deerfield, especially in dry years.

Opposition to the West Deerfield project would be considerable. The Franklin County Department of Planning objected to the scale of withdrawals proposed. The department claimed that a diversion schedule for more than 138 days is too long and perhaps should be reduced to below 89 days a year.¹⁸

The Division of Fisheries and Game has voiced opposition to the West Deerfield diversion since "it involves weir construction for assurance of depth control and affects free flowing stream character."¹⁹

The Deerfield River currently is being considered for no less than three water development projects the Bear Swamp pump storage project, the Corps of Engineers meadows flood control dam, and the West Deerfield diversion. The certainty of the first two projects would likely serve to intensify opposition to the third due to the fear of the cumulative effects of development. Those who oppose the project on grounds that it will have detrimental impact on the Deerfield River could expect support from region and statewide forces who would oppose additional diversions from the Connecticut River. Moreover, all who oppose the project

18. Ibid.

19. Letter of March 6, 1970 from James M. Sheppard, . . . op. cit.

out of nonwater supply concerns would doubtlessly be reinforced by those who would object to its relatively high cost.

Connecticut River Diversions: The Cumulative Effects of an Additional 500 mgd in 2020. The out-of-basin diversion cited for the Connecticut River is 500 mgd for 2020.²⁰ This major diversion assumes the prior construction of 1990 projects to yield 180 mgd (e.g., any combination of 55 mgd from the Tully Dam, and 125 mgd from the Northfield, Hadley or West Deerfield projects). Thus, the positive or negative effects of the incremental 500 mgd diversion of Connecticut River water is equivalent to the cumulative effect of the total maximum diversions of 680 mgd proposed for the Connecticut River through 2020.

While average withdrawals would not appear to pose a major hazard (if one accepts the Connecticut River comprehensive plan's estimates for downstream user needs), there is some question about the effect these cumulative diversions will have on high flow levels. The major unresolved issue is what role the seasonally high flows play in maintaining the vitality of the river and its ecosystem. This issue will require greater attention before the total Connecticut diversions envisioned for 2020 can be confidently undertaken.

The added 500 mgd diversion also could have an important effect on the Quabbin Reservoir. Currently the Quabbin has a potential yield of

20. An additional plan would withdraw 550 mgd, if it were to include service to Bristol County. Discussion here of the 500 mgd diversions would also be generally applicable to a 500 mgd scale.

780 mgd which is more than its drainage area could produce. The current yield of Quabbin is 195 mgd which includes diversions from the Ware and Swift Rivers, and the current yield of the Wachusett Reservoir is 95 mgd for a combined total yield of 290 mgd. The maximum 1990 Connecticut River diversions to Quabbin could total 180 mgd, which would increase the Quabbin/Wachusett system to a total yield of 470 mgd. Thus, the system could support an additional major construction. Augmentation of 500 mgd, on the other hand, would require heightening the Winsor Dam and accompanying dikes by 20 feet in order to provide additional storage of 480,000 acre feet capable of supporting an additional 190 mgd, or a total yield of 970 mgd. Moreover, the Quabbin/Wachusett aqueduct system has a capacity of 610 mgd which is sufficient to support only an additional 290 mgd in 2020. Thus, if the total 500 mgd addition were to be utilized, a new aqueduct would have to be constructed.

The extent to which the water quality of the Quabbin would be impaired depends upon the quality of Connecticut River water by 2020. Although the diverted water would be chlorinated before introduction into the reservoir, the 500 mgd project does not call for segregation of water in detention pools for observation before release into the main reservoir. Thus, if there were no change in the quality of Connecticut River water, there may be a greater chance here than in the 1990 Connecticut diversions of introducing undesirable species of fish and other organisms and contamination, into Quabbin. Currently, plans for cleaning up the Connecticut River call for raising water quality from Class D to Class B. Therefore,

at the very least, diversion of water into Quabbin would reduce the reservoir's water quality from Class A to a mixture of Class A and Class B. Improved Connecticut River water quality does not assure the elimination of "trash fish" which could still pose a potential annoyance.

The recreational value of Quabbin may be impaired somewhat by the inferior water quality and greater numbers of undesirable fish than currently inhabit the reservoir. Expansion of Quabbin's capacity by raising the water level 20 feet might also require relocating recreational areas, not to mention the possible inundation of several roads to the north of the reservoir. Additional diking would be required if serious damage were to be avoided. On the other hand, a 10-foot increase in the height of the reservoir might be accomplished without serious consequences. The addition of water surface for recreation would appear to be of insignificant marginal utility given the very large surface area of Quabbin (38 square miles) at the present time.

Connecticut River Water for In-Basin Use

Two projects are cited as alternative means for meeting Hampden County's proposed 40 mgd water deficit in 2020. Since both projects would utilize surface water within the Connecticut River Basin for in-basin use, the water would be returned to the river and no permanent flow reduction would result other than consumptive losses due to use.

The Lower Pioneer Valley Regional Planning Commission has indicated that their consultants, Metcalf & Eddy, "note that the ideas presented

in the draft NEWS study) are generally in line with their own proposed development plan for this Pioneer Valley regional water supply."²¹

Knightville Reservoir: 42 mgd in 2020. This project would entail reconstructing the existing Corps of Engineers single purpose flood control reservoir, Knightville, in the Westfield River Basin to provide recreation and low flow augmentation. During the September-June period, water would be diverted to the water supply pool at Littleville, an existing Corps of Engineers reservoir, via a 2.2-mile, 54-inch aqueduct, which in turn is connected to the Springfield water system through an existing force main to the Cobble Mountain-Borden Brook complex. The incremental yield available from Knightville is approximately 20 mgd and from the Littleville-Cobble Mountain-Borden Brook complex about 10 mgd.

In addition, another 12 mgd could be developed from the Cobble Mountain-Borden Brook Reservoir by a modification of operating rules for the hydroelectric facilities.

If the Knightville Reservoir were to be raised 10 feet to provide the necessary additional storage capacity for low flow augmentation, there might also be a possibility for minor additional flood control potential. The Knightville Dam originally was designed to be raised 10 feet, and the Connecticut River comprehensive plan also envisions such a modification.

21. Letter of January 14, 1970 from K. M. Munnich, planning director, Lower Pioneer Valley Regional Planning Commission to Charles F. Kennedy, director, Water Resources Commission.

The diversions would reduce the overall flow of the Westfield River during autumn and winter and early spring. Assuming there would be no diversions during low flow months, no negative effect on water quality would be expected.

The augmentation of the Knightville project could provide additional surface water recreation depending upon the extent to which boating, fishing or swimming were permitted by the state Department of Health. The project description calls for diversions from Knightville only during "nonrecreation" months, presumably late autumn to early spring, so that recreational activities would not be impaired. Further inundation of land may have negative recreational effects for hikers, campers, hunters, etc., and as well for unforeseen types of popular recreation (e.g., ski-mobiling has become increasingly popular in the last several years, a development which would have been difficult to predict 10 years ago). Recreation is an increasingly important industry in the area.

Irrigation, power and navigation would appear to be not significantly affected by the project.

Local resistance to augmentation of the Knightville Reservoir could be substantial. When Springfield constructed the original Cobble Mountain-Borden Brook complex bad feelings arose between the city and area residents over the inundation of land and construction of lines across private property. The persistence of historical grievance could

exacerbate whatever other local complaints might arise. Existing legislation pushed by Littleville at the time of the original construction gives the towns of Westfield, Chester, Huntington, Russel and Littleville the right to meet their own water needs from those facilities. Local resistance might be expected to decline should those towns become dependent upon the system for their own future water needs.

Connecticut River Mainstem: 40 mgd in 2020. This project could withdraw 40 mgd directly from the Connecticut River (without flow augmentation) to be treated and delivered directly to municipalities within the basin (in Hampden County). An intake structure below South Hadley, lift pumping station, 80 mgd treatment plant, high lift pumping station, and a 7.4-mile, 48-inch cut-and-cover aqueduct to Springfield would be required.

The 40 mgd mainstem project appears to have no significant positive or negative side effects.

There is an apparent trade-off between the cost of locating the intake facilities above Holyoke and the quality of the water diverted (i.e., tunneling to a point above Holyoke avoids Holyoke's effluent but is costlier than withdrawing at Springfield). Significant expense-- in the form of pipeline construction through urban settlement to Springfield-- could be spared by improving the quality of Holyoke sewage and locating the point of diversion closer to Springfield. Moreover, diversion at Springfield could increase the pressure on Holyoke to provide more effective sewage treatment.

Developing the Merrimack River

The NEWS engineering study cites development of the Merrimack River for three alternative projects in 1990 and two alternative projects in 2020, any of which could utilize upstream storage for low flow augmentation to allow for direct withdrawals at Lowell, Massachusetts. In addition, a floodskimming project has been outlined as an alternative to the large scale regional projects proposed for 1990 and 2020.

Since all these projects are all essentially variations of a single theme, issues common to all of them will be discussed.

The organizational, legal and economic feasibility of the Merrimack examples rest on three issues:

1. What would be the effect of the low flow augmentation reservoirs in New Hampshire, and what will be the response of New Hampshire residents to their proposed construction?
2. What would be the effect of the proposed diversions-- of both year round withdrawals and floodskimming-- on the Merrimack River Basin and estuary, and what will be the response of Massachusetts residents to their implementation?
3. Each of the projects would require organization on a broader regional scale than now exists. What are the possibilities and constraints on the development of an effective regional approach?

Upstream Storage in New Hampshire. Formidable opposition can be expected to any proposal for the construction of low flow augmentation reservoirs in New Hampshire, from four types of groups or individuals in New Hampshire: landowners primarily concerned about the loss of property; local public officials primarily concerned about the loss of tax base (this threat will be less acute, of course, if towns are compensated for

their loss or if a project promises to provide or attract new taxable development); conservation groups and individuals concerned with environmental protection; and state agencies. The New Hampshire Fish and Game Commission is opposed to the further depletion of wild streams in the state. The Department of Natural Resources and Economic Development and the Water Resources Board²² have taken a more detached view of the proposals and probably will wait until firm plans are made public before taking a position. The Department of Natural Resources and Economic Development supported the Corps of Engineers' proposal to use the flood control dam on the Blackwater River for recreation in the face of heated local opposition. The project nevertheless was soundly defeated.

Political leaders in New Hampshire have been increasingly sensitive in recent years to the complaints of their constituencies over proposed large scale public works projects.

Diversions from the Merrimack River. The 35 mgd development at Lowell listed for 1990 would be utilized entirely in-basin. Of the proposed 50 mgd diversion, 35 mgd also would be returned to the river. Hence, neither of these projects would have an appreciable effect on the overall flow level of the Merrimack. However, all of the larger projects-- both direct withdrawals and floodskimming-- would divert water out-of-basin. The impact of these diversions on the Merrimack River and

22. The Water Resources Board officially is attached to the Department of Natural Resources and Economic Development; however, its head is appointed directly by the governor and it has independent authority to float bonds.

estuary will be of prime importance in considering the potential impact of the projects and the opposition which can be expected to them.

The Merrimack River and estuary constitute one of the most productive river systems in New England. Despite the pollution of the river, the estuary has remained an important recreation and economic resource.

In 1964 the catches of the relatively small lobster and crab industry were valued at about \$14,000, while some 3,000 gallons of clam worms valued at \$36,000 were harvested. Only 1,470 bushels of soft-shell clams valued at \$14,000 were sold, although it is estimated that a clean river and estuary could produce as many as 30,000 bushels of clams for a 1964 value of about \$300,000.²³

In 1964 fees for fares, boat rentals, and launching ramp privileges, plus the sale of fish from both sport and commercial fishing provided an income of some \$385,000. In addition, it is estimated that sport fishermen in the area spent more than \$1 million in total expenses in the area,²⁴ while angling for striped bass, mackeral and blackback flounder.

While pollution has always discouraged use of the river for water supply and requires substantial treatment, the Merrimack is the main source of water supply for the cities of Lawrence and Lowell in Massachusetts.

23. William C. Jerome, Jr., Arthur P. Chesmore, Charles O. Anderson, Jr., and Frank Grice, A Study of the Marine Resources of the Merrimack River Estuary, Division of Marine Fisheries, Massachusetts Department of Natural Resources (June 1965), p. 87.

24. Ibid., p. 87.

The cited direct withdrawal projects would include sufficient upstream storage to meet minimum flow standards in the Merrimack River at Lowell in the historically severest drought conditions. The flood-skimming project also would observe the minimum flow standards.

While the flow reduction contemplated in the floodskimming project for high flow months is less than the month-to-month or year-to-year fluctuations of the river, there have been no studies carefully analyzing the long-term ecological effects of additional, prolonged diversions of significant size.

There are no precedents by which to predict procedures. Municipalities within the basin will be increasingly dependent on the Merrimack for their own water supply. They could become reluctant to have the river used as a major source for eastern Massachusetts fearing a depletion of their own future supplies. This fear should be minimized by the fact that Merrimack basin communities are included within the supply areas of the diversions outlined in the NEWS study. Moreover, association with a large scale regional system could minimize the fear of being caught short in the future.

Local governments will also be cautious about potential economic damage. For example, activities associated with the Merrimack estuary are estimated to provide some \$300,000 annually to the economy of Newburyport.²⁵

25. Ibid., p. 88.

Local conservation commissions and private groups as well as statewide conservation groups at the very least could be expected to raise serious questions about the potential harm of the diversions. Since there appears to be no convincing evidence that specific harm would in fact result, most such questions probably will concern the nature and potential damage of unknown factors. Opposition based upon uncertainty tends to become emotional for lack of more clearly debatable issues. Emotional opposition, in turn, if successfully communicated to a receptive public, can have profound effects on the political decisions which ultimately will determine whether or not the diversions will take place.

All of these factors argue first for more intense investigation by publicly recognized authorities of the unknowns associated with the proposed Merrimack diversions. Uncertainty will not necessarily be eliminated thereby, but it should be reduced, its parameters clarified, and the probability of undesirable occurrences more accurately estimated. Second, the above factors also suggest the advisability of minimizing diversions, either by one of the means mentioned previously or by making moderate withdrawals from the Merrimack and taking additional amounts from other sources, e.g., the Connecticut River.

Other Merrimack Projects. Three proposals for regional development of various scales are listed for 1990 by the NEWS study. The project calling for 35 mgd for northern Middlesex and northern Essex Counties could be a nucleus for regional development. Since the ground water sources

in the Merrimack basin appear to be reaching their capacity yields, many communities are seriously considering the Merrimack River as a new source of supply. To date, most of these communities have considered either small diversion facilities and treatment plants of their own or contracting with the city of Lowell. Lowell, in turn, is reaching the capacity of its 10.5 mgd treatment plant and therefore is considering major new construction. The cited project could provide a 35 mgd treatment plant which either could supplement existing local systems on a regional basis or become the nucleus for a regional system which would be responsible for all water supply within the area. Whether or not the natural reluctance of most towns to give up their water supply independence can be overcome in favor of regional development will depend largely on the savings which could be attained by going the latter route.

The Merrimack diversions cited for the year 2020 envision a broad regional development, including the MDC area, North Plymouth County, and the Ipswich River Basin-- all three of which will have to go out-of-basin for additional supplies-- as well as the Merrimack River Basin, and possibly Bristol County in the event the Taunton River estuary dam is not constructed.

If the Merrimack communities are successful in creating a regional system in 1990, it will not necessarily be economical or otherwise desirable for that system to emerge with a still larger eastern Massachusetts grouping in 2020. Rather, those communities may find it preferable to expand their own regional facilities independently. Indeed, depending upon

the demand for water resources in the future, the Merrimack Regional Association may oppose, and as a unified group of communities might be powerful enough to prevent, diversions from the river for out-of-basin use.

C h a p t e r 5

WATER SUPPLY FOR RHODE ISLAND

INTRODUCTION

Most of the projects listed for Rhode Island in the NEWS draft engineering report have also been studied and incorporated as components of the Rhode Island statewide plan. In terms of formal planning, the state has projected its needs and proposed projects only to the year 1990, and anticipates that intrastate sources will suffice until about the turn of the century. Openly expressed reluctance to undertake projects with interstate implications delimit the range of possibilities for Rhode Island's role in a regional institutional framework for water supply development.

Within the next two decades the most pressing needs for new supplies will occur in the communities on the urban fringe of the Providence metropolitan area. About 10 such municipalities appear to be relying on the extension of the already dominant Providence water system--an existing regional system which will eventually serve over half the state's population, if present state plans are implemented. These plans embrace most of the remaining surface sources, the watersheds of which cover a substantial portion of the state's land area including many sections prized by conservationists, outdoorsmen and sportsmen. Still at issue are policies governing the development and the use of the water supply facilities. Among these are multiple use considerations, questions

of staging, and representation of the developer's customers in the policy formulation process.

In the northern tier of the state the two major cities face the most severe short-range supply problems and have been locked into a classic source-area versus consumption-area struggle with rural towns to the west. Even with the full support of the state water agency behind efforts to develop these sources, no progress has been made since the first major attempt about six years ago. Here opportunity costs are mixed with questions of broad public interest versus local control in a setting where the cities facing shortages have been unable to attract allies to their cause since provision has already been made for the majority of the state's residents, who are therefore less likely to support additional state bond issues for the benefit of other areas.

For the southern part of the state, issues entail selection of alternative distribution systems.

Pervading all of these issues is the matter of institutional arrangements through which planning and policy decisions will be made.

One challenging task is the introduction of a more comprehensive, broader based planning process than now exists in Rhode Island. An essentially single purpose focus in the state water agency is reinforced by the similar perspective of the most highly regarded municipal system, a probable developer of the major regional sources.

If interregional controversies were resolved, there would remain issues pertaining to construction and operation of water supply facilities.

Foremost among these is the role of the state in development and financing in relation to both the federal government and the towns and cities. Rhode Island planners and political leaders accept the felt need of local governments to retain a meaningful role in the field of water supply.

More extensive federal action in Rhode Island water supply development could help to rectify present shortcomings in planning and difficulties in securing adequate funding, but political and bureaucratic shibboleths are arrayed against federal incentives for change.

ORGANIZATION FOR WATER SUPPLY

The leading actors-- institutional and individual-- on the water resources scene in Rhode Island can be described in six categories: the governor; the legislature; the Providence Water Supply Board; the state Water Resources Board; public and private water systems other than Providence, and conservationists.

The Governor

With his broad influence over the General Assembly, his power to appoint department heads, three of whom sit as ex officio members on the Water Resources Board (WRB), and his necessary role as coordinator of state programs through executive leadership and the budgetary process, the governor is a strong force in water management within the state. As there are no resources' specialists on the governor's staff, he relies heavily upon existing agencies and special study groups and commissions for advice on water matters. On state planning matters, he receives recommendations

from an active statewide planning clearinghouse, known formally as the Rhode Island Statewide Comprehensive Transportation and Land Use Planning Program.

The governor influences the actions of the Water Resources Board, and any substantial changes in state water policy-- and even many day-to-day policy decisions-- will probably require his endorsement.

For example, before openly advocating revenue bonds, the WRB checked with Governor Licht; then the board appointed a subcommittee to look into the question; and before releasing its findings the subcommittee would go back again to the governor. While the WRB does not have to go back to the General Assembly once it selects a developer for the Big/Wood project, as a matter of political reality (rather than law) Governor Licht's approval would be required before proceeding with the lease.

The Legislature

Rhode Island legislators serve part time and have no personal staffs. Democrats at present control both the Senate and the House of Representatives.

On water matters, legislators tend to seek information from the chairman of the Joint Legislative Committee on Water Resources because of his familiarity with the subject by virtue of his ex officio membership on the Water Resources Board. The chairman, representing Providence district, usually reflects a traditional water supply point of view.

The joint committee has few planning resources. It works only on bills that come into the legislature and must rely on reports and hearings of other bodies (principally the WRB).

Nevertheless, the legislature retains important power over water resource development in Rhode Island. It must pass on bond issues to be put before the electorate, and sets policy for recreation at reservoir sites. Bills for the acquisition of reservoir sites in northern Rhode Island died four times in the past five years in legislative committees (chiefly the finance committees), due in large part to the wishes of legislators from the areas affected-- a Rhode Island counterpart of "senatorial courtesy."

The Providence Water Supply Board

The Providence Water Supply Board (PWSB) enjoys high prestige within Rhode Island among engineers, legislators, the press, and the public at large; it is variously described as one of the best waterworks systems in the United States or as the finest in the world. Its early source development and engineering work was foresighted and of high quality; it has never restricted the use of water, which is of excellent quality; it has received positive recognition from insurance underwriters; and, Providence citizens are proud of the system. It has long been considered the city's most professional agency, and it turns a profit which is usually plowed back into the plant.¹

1. This is not required by law. For the period ending September 30, 1969 the PWSB operations produced a surplus of over \$800,000, which Mayor Doorley announced would be held in reserve for future spending on the Big and Wood River Reservoirs. When (and if) the city undertook these projects, Doorley noted, it could no longer count on the board for surplus-building help for many years. Providence Evening Bulletin, February 6, 1970.

In addition to the present large base of support, the PWSB's public esteem and political support are likely to increase if the Big/Wood project is carried out. That project would enable the city system to increase its capacity substantially so as to permit exportation of water to even more outlying jurisdictions than are presently served by Providence (expected increase is from 10 to 19). East Providence, Warren, Barrington and Bristol-- cities on the east side of the bay which experienced water troubles during the drought-- were expected to tap the Providence system. East Providence joined the larger system, but the other three areas are still negotiating. If present proposals are implemented, the Providence system will ultimately serve approximately 55 percent of the Rhode Island population. Naturally water-short localities' expectations of such assistance contribute strongly to support throughout the state for the agency that is able to fulfill the needs.

The Water Resources Board

If, as appears likely, the Providence board succeeds in becoming the major regional supplier to outlying areas not now adequately served, it will do so with the active cooperation of the state WRB.

The board was created in 1967 as the successor to the Water Resources Coordinating Board, which was primarily an advisory body. After the drought of the 1960's, recommendations were made for a stronger statewide water agency with a more effective policy-making role. The

legislation creating the WRB established it as an independent agency with a nine-member board.²

Among the board's powers are two critical functions (1) allocation of water resources to service areas in such a way as to guarantee that all will be provided a supply of water (the ability to effect this public policy is assured by the WRB's power to approve every extension of present systems and all new systems for areas not served as of May 24, 1967 (G.L. 45-15-7)); and (2) power to insist, in reviewing applications, that transmission lines be developed so as to serve (later) another community likely to need water from the source being developed (G.L. 45-15-10). The WRB was expected to assess all potential water resources in the state and foster and guide water-related uses. But despite broad statements of purpose relating to water resources planning in the board's charter, its powers and functions are primarily directed to review of water supply development.³ Understandably, then, it does not in effect apply a multiple purpose, multiple means perspective on water issues.

Furthermore, the ventures which it has undertaken have yet to reach fruition, and some difficulties have been encountered along the

2. Established water supply interests apparently had a strong hand in drawing up the legislation creating the WRB. During the bill's progress through the legislature a provision that the board be situated within another line department was dropped by amendment, with the result that it is now an independent agency reporting directly to the chief executive.

3. Compare G.L. 45-15-1 to 45-15-6, 7 and 10. The 1967 Statewide Comprehensive Planning Program, Report of the Governor's Task Force on Water Resources Planning contains a broad but rather vague "comprehensive water resources" charge to the proposed new agency (e.g., the board should promote "an ecological approach to resource problems") p. 32, but the emphasis is clearly on water supply.

way (e.g., need to seek a second, supplemental bond issue for site acquisition in its first project; failure to campaign for Tarkiln-Nipmuc bonds). The original legislation did not provide the agency with an independent source of funds.

WRB's power to require intercommunity arrangements provides one alternative regional approach. For example, through WRB auspices agreement was reached between the city of Warwick and the Kent County Water Authority. The Kent County system would eventually have had to install 16-inch pipes to service a certain area. Meanwhile Warwick was installing facilities that ran along a closely parallel line. With no state money involved, it was agreed that Warwick would enlarge its pipes from 36 inches to 42 inches to accommodate Kent's needs. The accord resulted in no inconvenience to Warwick (which was reimbursed by Kent) and in considerable savings to Kent.

WRB access to funds is problematical. In 1969 the first step in that direction was taken in the creation of a Water Development Fund to receive money coming to the state from lease of reservoir sites and from sale of surplus property (e.g., timber and gravel) on the sites prior to development. The funding bill, supported by Governor Licht, authorized the WRB to set up a special revolving fund using rents and other income to make loans to public water agencies to buy equipment, acquire sites, make surveys and build reservoirs. If the fund reached \$1 million, any excess would go to the state treasury. The General Assembly amended the provisions for the fund to make use of such monies available for all projects

pertaining to water resources except the purchase of reservoir sites.⁴ In order to acquire sites for dams and reservoirs, then, it is still necessary to cross two hurdles in Rhode Island-- obtaining approvals of acquisition funds from the General Assembly and from the electorate through bond issue referenda. Now about one year old, the fund contains about \$120,000; and rules and regulations for its use have not yet been completed.

Meanwhile, the WRB has sought to develop other sources of financing; chiefly through a study of the feasibility of floating revenue bonds, which (unlike general obligation bonds) would require assent from neither the legislature nor the public.⁵ Revenue from the bonds would enable the WRB to assist local water expansion projects that are too costly to be financed out of its special development fund.

Progress along these lines has been hindered by legal and political difficulties. The WRB is not currently authorized to handle revenue bonds. Legally, as long as the board is within the state government and possesses state property, the state's full faith and credit must be tied to its operations. Its form would therefore have to be changed, or a separate authority created. Past state Supreme Court decisions might make it necessary for the revenue bonds to be completely self-liquidating to avoid the constitutional requirement of a referendum where the state's credit is

4. According to legislative sources, this amendment was designed specifically to thwart progress on the Tarkiln-Nipmuc projects.

5. It would, as is always the case, be more costly: about 9 percent compared to 6-7 percent on general obligation bonds.

involved. The bond issue currently proposed has therefore been focused upon specific projects that need assistance.⁶

Representative Travers, chairman of the three-man WRB Study Committee to Prepare Bond Legislation, noted recently that while he is sympathetic to the needs of the communities that would be assisted by the loans he did not want to see the WRB accused of trying to obtain revenue bonds when it had not been able to win passage of general obligation bonds for Nipmuc-Tarkiln. "That would be dynamite," he stated.⁷ In any case, barely two weeks after the board's aims were made public (six weeks after the initial discussions at closed meetings) Governor Licht announced that he would support only highway bonds. The proposed WRB issue was not, then, a part of the administration's bonding proposal. No support for water supply funding is expected to materialize in 1971 either.

Local Agencies and Interests

Two of the five regular WRB members must by law be affiliated with public water systems. There are 48 water supply systems in the state. Among these are three of the state's largest cities: Providence (two reservoirs in planning), Pawtucket and Woonsocket (which would utilize the two northern tier reservoirs). For these cities, WRB action would enable development to proceed more cheaply than would be the case

6. Roughly: assistance to Bristol County towns for cross-bay connector (\$9 million), well field developments in upper Pawcatuck basin (\$8 million), and other miscellaneous local projects (\$5 million).

7. Providence Journal, February 10, 1970.

if the cities proceeded independently. The proposed projects remain local in the sense that they would be used for local water supply, and leases on good terms would be provided. The Kent County Water Authority has statutory authority to hold up planned action by WRB and Providence, but is willing to let another agency develop the new sources and then to pass along the water to customers, especially given the existence of an experienced and successful developer in the PWSB. Under the proposed new regime, the Kent authority would most likely continue its mixed operations, developing some supplies from its own sources (wells and ponds) as well as distributing water purchased "wholesale" from Providence.

Many localities are looking to the WRB (and the extension of the Providence system) for assistance in meeting pressing water needs. Some of these cities and towns have been unable to obtain federal funding for water supply improvements and extensions (applications rejected by HUD), and it is anticipated that WRB action can facilitate the securing of federal assistance. (Presumably a long-range plan-- to 2020-- regional in scope, would be more attractive to HUD.) In the present situation, these communities have often had to rely on private suppliers whose service has sometimes been quite inadequate.

A good case in point concerns the three Bristol County towns of Barrington, Warren and Bristol which have been dissatisfied with the performance of the Bristol County Water Company. The BCWC having obtained WRB approval of a plan to tap the Providence system,⁸ sought to have the

8. To replace deteriorating present sources, wells which have been polluted by iron.

towns assume the cost of the tie-in (via the cross-bay connector). At the same time, the company was seeking a 19 percent rate increase,⁹ and the company estimated that rates would later have to be raised by 110 percent to pay for the new pipeline. In reaction to these developments, the three town councils studied the situation jointly and prepared legislation to create a Bristol County Water Authority with power to take over the company and obtain outside funding assistance-- primarily from the WRB.¹⁰ The towns turned increasingly toward the idea of WRB assistance as an alternative to takeover of the company upon hearing about the formation of the WRB subcommittee to look into feasibility of revenue bond funding to assist localities.¹¹

9. Denied by the state Public Utilities Commission in mid-February, Providence Journal, February 19, 1970; in late 1969, the company was also taken to court for pollution violations by property owners along the Kickemuit River.

10. These alternate strategies derived from the report in December 1969 of a special Bristol County Water Committee, appointed by the towns in December 1966, Providence Journal, December 5, 1969.

11. The specific possibility of WRB aid (loans) to Bristol County was first discussed at a board meeting in early February 1970, Providence Journal, December 10, 1969 and February 10, 1970; Providence Evening Bulletin, January 13 and 28, 1970, Warren Times, January 13 and 22, 1970. Senator Arthur Kidder of Barrington, the first appointee to the authority (still in its formative stage), noted that even if aid is received from the state, the county authority would serve a worthwhile purpose; the reduction in debt service gained would save approximately 2 percent on the cost of money if the WRB had the power to finance water-related projects through revenue bonds.

Under this plan the WRB would own the line and be eligible for federal grants. Revenue bonds for the project would be secured by agreements with the company which would lease the pipeline; no state credit or tax dollars would be involved. When the bonds were retired, the pipeline would remain the state's property. Repayment of bonds would be from water revenues or rentals, Warren Times, February 10, 1970.

Numerous other local jurisdictions have expressed interest in similar arrangements with the WRB and the Providence system. For example, on learning of the Bristol County proposal in December 1969, Senator Walter J. Miska of Portsmouth noted that Aquidneck Island would soon need more water: "I'm sure the island wants to participate in this venture." He envisaged inclusion of Newport in a regional system for the east side of Narragansett Bay.¹² Other areas recently expressing interest in linking into the Providence system or developing new sources in collaboration with the WRB include the Kingstons and Narragansett (where wastes have been polluting individual wells), and West Greenwich.¹³

Conservationists and Their Allies

Conservationists in Rhode Island oppose the water supply development program proposed by the WRB and Providence system. The center for conservationist activity in Rhode Island has been the Audubon Society of Rhode Island. The society's executive director, Alfred L. Hawkes, has been the central figure in organizing forces in support of environmental protection.¹⁴ Through its newsletter, the Rhode Island Audubon Society

12. Providence Journal, December 5, 1969. Note: The WRB tentative statewide plan calls for piping ground water to Aquidneck from south central Rhode Island.

13. The official state projections of possible future shortages by area are presented in the 1969 Statewide Comprehensive Planning Program's Plan for the Development and Use of Public Water Supplies.

14. Hawkes, in addition to his work with the Audubon Society, is cofounder of the Rhode Island Citizens Committee for Clean Water; president of the Air Pollution Control League of Rhode Island; adviser to Ecological Action for Rhode Island (a group of college students); former chairman of the state Natural Resources Department's Advisory Council; an active member of the Natural Resources Group. He was instrumental in introducing local conservation commissions in the state.

has publicized conservation issues and positions taken by allied interest groups. A major plank has been the desirability of obtaining support for an in-depth analysis of the water resources situation in Rhode Island by an objective, outside team of experts.

The Citizens Committee for Clean Water (CCCW) was established in 1966 to campaign for a comprehensive state water policy and to urge coordinated state planning of water supply and sewage disposal programs. The committee president, David F. Sweeney, has prepared two antipollution lawsuits that seek to establish new principles in citizens' rights against polluters. The committee now includes more than 10 organizations, including garden clubs and women's groups.

An informal association of conservationists, known as the Natural Resources Group, represents an attempt to bring together interested parties in and out of government to concert strategies and plan programs.

Among the other conservationist allies are the Sportsmen's Federation, which is still chiefly interested in recreation, and the state's garden clubs, which tend to follow the Audubon Society's lead.

The Rhode Island League of Women Voters studied the water situation five years ago and concluded that it should support the proposed WRB-Providence program. The framework of debate has broadened since that time, and conservation groups hope to win over the league to opposition to the proposed program.

A new confederation was in the process of formation in March-April 1970 to transcend particular interests of the constituent groups,

speak for all with a united voice, and permit the associated units to retain autonomy for their own activities and play a policy role in the parent organization. Conservationists expect that the new association, the Environmental Quality Council, Inc., will be a broader, more powerful group than has been the Wildlife Federation.

The Citizens Committee for Clean Water pressed long and hard for an opportunity to present its views to the WRB before the board agreed, in April 1969, to see two representatives. The WRB did not pursue the CCCW's suggestion for a study of alternative approaches to water development; and the committee spokesmen did not respond to an invitation by the WRB to submit ideas of the kinds of recreation that should be permitted on and around reservoirs.

Notwithstanding such limited encounters, conservationists have had some influence in Rhode Island. The earliest success was related to recreation policy at reservoir sites. When the bond issue for the Big/Wood site acquisition was first put to the voters, the Audubon Society was a major factor in the bond issue's defeat. When the issue arose next time, conservationists were apparently satisfied by the legislature's retaining control over recreational policy at new reservoirs, rather than yielding control to the WRB or the PWSB, which would have imposed severe restrictions on such use. Two Big/Wood bond issues have since passed. And in January 1969 the WRB-- in a move apparently designed to meet "mounting criticism from conservationists of its burgeoning reservoir development program"--

issued a policy statement in which it accepted more liberal principles of multiple use reservoir development.¹⁵

In a large scale campaign, conservationists aroused an otherwise unconcerned populace against dangers to the environment alleged to be inherent in a proposed dike across Narragansett Bay; the governor subsequently asked the Corps of Engineers to abandon that project idea.

The Natural Resources Department's Advisory Council provides a forum for exchanges of views among line agency administrators and conservation interests. Within the legislature, too, the environmental cause is being felt in both houses; some members, mainly newly elected, few in number but vocal and sometimes in important committee positions, have joined with local resisters to reservoir projects. The local resisters include representatives of communities mainly in the northeast corner of the state, which have either been adversely affected by previous projects or fear "inundation" by proposed WRB projects. These communities oppose programs for diverse reasons-- including reluctance to yield taxable land; desire to proceed with other development schemes, etc.

Finally, the local conservation commissions thus far established for 27 Rhode Island communities present possibilities for environmental action that are as yet largely unrealized. Following the lead of Massachusetts, Rhode Island was the second state to adopt this device, which was accepted in 1960.¹⁶

15. Providence Evening Bulletin, January 13, 1969.

16. See report by William J. Duddleson on Rhode Island in Andrew J. W. Scheffy, Conservation Commissions in Massachusetts, the Conservation Foundation, Washington, D. C. (1969), pp. 171-176.

There are now about 30 local commissions in Rhode Island, but their impact-- with respect to water resources has not been great. In Rhode Island, as in Massachusetts, the enabling legislation charges them with matters of land inventories, land use and preservation. The Natural Resources Department liaison officer to the commissions could recall no instance of water supply-related activity by any of the commissions.

Before they become a real influence in Rhode Island affairs, the commissions need more authority and money. Now they are only advisory bodies, with no power to stop action or effectuate policy. The legislation creating them is permissive rather than mandatory. Supporters of the local commissions believe that, in addition to serving a liaison function, the Department of Natural Resources should provide a resource specialist assigned full time to work with local commissions. The state provided no support at all until 1969, and funding is pitifully low.¹⁷

The crucial matter of the Big/Wood lease appears about to be resolved; if it is, policy options for sites involving half of the state's remaining water resources may quickly be foreclosed.

ISSUES IN WATER SUPPLY MANAGEMENT

Recreation Policy

The controversy in Rhode Island over recreation policy at and around reservoir sites has been couched in terms of "Health Defenders vs.

17. Unlike the commissions in Massachusetts, which receive substantial direct financial assistance and staff support from the state, commissions in Rhode Island are financed locally, and receive no direct funds, and only minor staff support from the state.

Outdoor Crusaders." Since the state is well endowed with fresh and salt water recreation areas, the debate was slow in coming into prominence and only arose recently with rapid population growth and ever increasing demands for outdoor recreation facilities.

In a departure from its complete closed-reservoir policy, in 1967 the PWSB offered to open one of its secondary reservoirs to limited recreational use on a trial basis and invited the state Department of Natural Resources to make a proposal for a boat launching ramp for fishermen on one of the secondary reservoirs in the Scituate system. For the following two years, negotiations proceeded between the two agencies. Eventually the talks collapsed as the department charged the board with imposing unreasonable requirements.

By January 1969, the city water board officially agreed to permit fishing and boating, under the auspices of the state Department of Natural Resources (with conditions on responsibility and regulations), on the five tributary Scituate reservoirs. The board would still permit no recreation on the terminal reservoir. Actually, recreational use had long been permitted on 11 of the 26 largest reservoirs in Rhode Island.¹⁸ Within the irregular system of differing reservoir use policies, many anomalies exist.

18. Fifteen closed-reservoirs were, in January 1969, operated by Providence, Pawtucket, East Providence, and the Bristol County Water Company; fishing was allowed on nine reservoirs operated by Woonsocket, Newport, and Cumberland; and all kinds of recreation, including swimming, were permitted on two other large reservoirs-- Staff Pond in Tiverton and Wallum Lake in Burrillville. See "Water Board Favors Reservoir Recreation" by Robert C. Frederiksen, Providence Evening Bulletin, January 13, 1969.

At the same time that the city board promulgated its new policy, the WRB proposed a bill that would have vested responsibility for setting recreation policy pertaining to new reservoirs in the board or the reservoir developer leasing the site from the state. Opinion on the WRB was split: a representative of a municipal system (with a closed-reservoir policy) advocated control by the leasee; the Department of Natural Resources member supported multiple use as consistent with public health practices but felt that the policy should be set by the board or the legislature; and Representative Travers of the Joint Committee on Water Resources supported control by the legislature,¹⁹ as had been stipulated by a 1964 act. Governor Licht remained neutral on the issue, and ultimately the WRB chose not to press the controversial bill.²⁰

This series of events illustrates the key role of the legislature in implementation of any regional water supply policy.

Comprehensive Water Resources Planning

A significant factor in opposition to the plans of the existing regional system in Rhode Island (WRB-Providence) is the fact that complete reliance upon surface development would necessitate the commitment of a team of resource economists and engineers. Alternatives to the Water Resources Board plans have not been explored, for the most part.²¹

19. Providence Journal, January 14, 1969.

20. Ibid., April 17, 1969.

21. The 1967 Metcalf & Eddy study, Report to the WRCB on a Development Plan for the Water Supply Resources of Rhode Island (Boston, 1967), was "used as the major source of all the alternatives and statistics that are discussed below" (in the 1969 report of the Statewide Comprehensive Planning Program)-- citation from p. 63. The NEWS draft engineering report also relied heavily on Metcalf & Eddy material.

Alfred L. Hawkes, the leading Rhode Island conservationist spokesman, maintains that a more comprehensive, broader based analysis is needed as a context for the engineering studies. So deeply are Rhode Island conservation leaders committed to this proposition that they have argued holding up the negotiations with Providence for the Big/Wood lease for two years in order to evaluate possible alternatives to the board's plan.

The WRB is not likely to require such a reappraisal, however. In October 1968, a proposed study by resource economists from the University of Rhode Island was opposed. A Providence Journal editorial explained "the thought of another study plainly exasperated the board . . . study after study and all kinds of recommendations cannot replace the ultimate board duty of decision-making. . . . It's about time the state board was allowed to write 'finals' to inventory studies of the state's water resources and donate its time and effort to development work."²²

Surface Development and Land Resources

A significant factor in opposition to the plans of the existing regional system in Rhode Island (WRB-Providence) is the fact that complete reliance upon surface development would necessitate the commitment of a large portion of the state's land area to reservoirs and their watersheds. The 1967 Metcalf & Eddy study predicted that the watersheds of 25 percent of the state's land area would be involved, and subsequent estimates by

22. Providence Journal, October 17, 1968. Funds to seek data for a comprehensive study of water resources were later given to the (then) new state Department of Community Affairs. The money was available through a grant from the federal Water Resources Council.

conservationists have ranged higher. Particularly in a small state, such a prediction attracts popular attention and not only among sportsmen and conservationists. The threat to the state's future environment (quality of life) is made to seem even greater when people are asked to envisage so many acres being placed under the strict control of the Providence water board, which would limit other uses and development substantially.

Alternative Technologies

Immediately following the drought of the early 1960's, many federal officials, congressmen and state-local leaders expressed considerable interest in new emphasis in water supply development. The act of Congress creating the NEWS study specifically called for detailed examination of new techniques. Rhode Island conservationists have expressed considerable interest in these ideas as well as in devising new management tools.

Present WRB plans include new ground water development to supply additional future requirements only in the southern portion of the state. Early in 1970, the WRB voted to seek legislation requiring well drillers to give notice of all wells drilled and to keep accurate records of well outputs in order to keep track of ground water supplies for future use.

The chief planner views ground water as an essential ingredient in a balanced statewide water plan.²³

Most water supply engineers, including those in Rhode Island, express considerable skepticism about the short-run possibilities of desalination. At the same time the bill authorizing the NEWS study was enacted, another bill was passed providing for expenditure of \$185 million to expand and accelerate water desalination development programs. In signing the bill into law in August 1965, President Lyndon B. Johnson predicted that by 1970 the nation would achieve a "great breakthrough" in conversion of salt water to fresh water at economic prices. At the end of the target year, such a breakthrough has yet to be accomplished. By 2020, when Rhode Island is expected to be feeling a pinch in water supply, the WRB head expects such techniques might be ready. In contrast, Rhode Island environmentalists would like to see more emphasis devoted to desalination as a water supply alternative before 2020 in order that scarce land and surface water resources might be spared from reservoir development.

Closely related to the development of alternative technologies are strategies which seek to conserve water use. Conservationists feel that by the time surface sources are fully developed in Rhode Island, per

23. The 1969 Statewide Comprehensive Planning Program, . . . , op. cit., for example, recommended two surface reservoirs plus ground water development in the northern tier of the state.

Some ground water advocates appear to overemphasize the potential of ground water as a substitute for surface projects. Critics claim that a plan to use ground water instead of developing the Big/Wood projects could ultimately dry up many bodies of water in the area. See Arthur D. Jeffrey, Economics of Water Supply in Rhode Island.

capita consumption will still be rising if no steps for demand management are taken. In an effort to prepare for the time when the supply of surface water is stretched to the limit to meet growing demand, conservation forces advocate two basic economic management tools to limit per capita water use. These strategies, ideally to be combined with other engineering approaches, are industrial recycling of waste water and manipulation of the costs of water and sewage treatment.

Rate structures for all water companies in Rhode Island appear askew to those who are interested in conserving water use. Companies charge lower rates for higher volumes of consumption along sliding charge scales, rather than providing incentives for water conservation. The existing scales do, however, reflect the costs of service to some extent. For example, when costs of billing, piping, service and maintenance are taken into account, the unit cost for supplying a million gallons daily of water to a single plant is lower than that for a block of residences which might consume about 30,000 gallons per day. Self-suppliers, who account for a very large share of water consumption in Rhode Island, would not be affected by the price system at all. Integration of water supply and sewerage charges of water sale profits to finance construction of sewage treatment plants would make recirculation more attractive economically and make households "more aware than they are now that water is not a free good."²⁴

24. Professor Neils Rohrholtm cited in Providence Journal, December 7, 1969. The Statewide Comprehensive Planning Program's report on water treatment stresses the direct link between consumption and treatment and urges using water bills to collect sewage treatment costs.

Sewage Treatment Requirements

Another aspect of the water supply-sewage treatment nexus which Rhode Island conservationists have stressed concerns the maintenance of stream quality standards during and after the proposed reservoir construction program.

Most Rhode Island stream standards have been approved by the FWQA. According to the state Health Department, capacity to treat 150 million gallons of sewage will be required by 1980 in order to meet these standards. However, on the basis of per capita use curves and population projections, the WRB is aiming toward 242 mgd for water supply by 2020. Most WRB water will be piped to sewerred communities. Contemplating these figures, conservation spokesmen ask how additional sewage treatment capacity will be supplied (after 1980), and how would it be financed? Since current plans for treatment end with the 150 mgd target, they view with alarm an apparent gap of 92 mgd between supply and treatment capacity.

Carleton Maine, chief of the Water Supply and Pollution Control Division of the Health Department, pointed out that no one-to-one relationship exists between water supply and sewage treatment volume. In Providence, for example, 42.7 mgd were consumed in 1968; and 34.5 mgd were treated at the city plant. Despite this "gap" of 8.2 mgd, the city has met its water quality requirements satisfactorily. In most other, less urbanized Rhode Island communities, the difference between quantities supplied and quantities treated is greater. The gap can be accounted for in several ways, including water used for lawn watering, air conditioning,

and other uses where it is not returned to the system directly, losses through evaporation; some leakage, and fire use.

Nevertheless, the problem of additional sewage treatment capacity after the goals of the present state treatment program are met requires study. The WRB is not presently responsible for planning or developing sewage facilities although it could be given that duty in the future. The health director sits ex officio on its board now.

ORGANIZATIONAL, LEGAL AND NONMONETARY
ECONOMIC FACTORS IN REGIONAL WATER SUPPLY:
ILLUSTRATIVE DISCUSSION OF SOME PROJECT ALTERNATIVES

It should be reiterated that the following discussion is illustrative and assumes the water supply benefits of project alternatives. The kinds of opportunity costs described therefore, cannot be equated with negative (or positive) judgments about the projects. The discussion illustrates the kinds of broad policy considerations and implementation procedures relevant to development.

Big and Wood River Reservoir Projects

The Big and Wood River projects, together with plans for development of surface sources at the Flat and Moosup Rivers, comprise what is known as the Big River Reservoir complex. Water from the other three sources would be transported to Big River Reservoir and, from there, piped into the Providence system. The yield of the total system would be 89 mgd by 2020.

Plans for development of a major new source were advanced several years ago because shortages loomed in the large metropolitan area partially

served by the Providence Water Supply Board. From the outset, the Big and Wood River sites were considered jointly. In 1962 a proposal for a \$5 million bond issue to acquire reservoir sites in Coventry, Exeter, East Greenwich and West Greenwich was defeated at the polls by a 95,915 vote. Two years later the same proposal was approved by 127,701 to 101,077 vote, and the state Water Resources Coordinating Board was empowered to purchase or condemn the necessary watershed. The board was not authorized to proceed with construction of the proposed system but only to obtain property.

The Big River Project

Controversy has surrounded the question of water quality along the south branch of the Pawtuxet below the proposed dam, and experts agree that the impact would almost certainly be negative. The amount of water to be released for free by the developer to maintain stream standards has been a sensitive question. To the extent that dilution water would be provided via releases, water quality problems would be minimized. However, the WRB has never released figures on the amounts of dilution water it envisages, nor has the Providence board (proposed developer); and the pollution control spokesman would not venture a guess as to how much dilution water is needed. Conservationists claim that so much water would have to be released to assure meeting water quality standards that the dam's utility for water supply would be impaired, and apparently a bondsman studying the project was impressed somewhat by this argument. Required releases for the Scituate system were determined by the courts, and the WRB

appears willing to rely on that device for settlement of the Big River Reservoir releases question.

Values for recreational development at the site range from minus (loss of forest land in natural state) to plus (lake created) depending on the observer's point of view. The possible plus rating would depend upon recreation on reservoirs that may, however, be restricted by the Providence board and the state WRB. Swimming is not discussed, boat launch plans bog down; and WRB requirements for shoreline developments are apparently so stringent that the Natural Resources Department cannot afford to carry them out.

As in the case of recreation, there exists-- with respect to ecological values-- a trade-off between X acres of trees and Y acres of water surface. Oxygen production associated with trees would be reduced, and the project would pre-empt spring runoff to the estuary. That flushing action is considered by some to be critically important to shellfish balances (as well as shoreline areas abutting streams) through its impact upon the oyster drill, for example. The possible adverse impact is dependent upon the percentage of stream flow affected. Beyond these factors, ecologists allege that (1) change per se is doubtful in that possible consequences on the ecosystem are unknown; and (2) the burden of proof is on the developer to demonstrate that no severe damages would arise as a result of the project's implementation.

It could be argued that environmental values are enhanced by the addition of water to wooded areas; but under present Providence policies, access would be restricted.

Finally, to the extent that water supply development pre-empts private opportunities on the site, local development is adversely affected. Not only the immediate reservoir site, but also the surrounding drainage area would be restricted as to use. As noted above, however, the battles over state takings have already been fought.

The Wood River Project

The dam site of the Wood River project lies in prime natural land, the Arcadia Management Area, a large portion of which would be inundated and withdrawn-- under present policies-- from most recreation uses. The Wood River has been described as the best trout stream of the state, the most productive section being at the dam site itself.

As with the Big River project, further inquiry is required to determine the effect of withdrawal upon water quality downstream. The Wood River is now Class A quality. During dry periods, water impounded in time of flood could be released to augment flows in the Pawtuxet River Basin, whose dilution flows cannot be reduced because of the heavy pollution load already present in the basin.²⁵

There might be some benefit in terms of flood control, but this is as yet not ascertained. While the project is in a wholly undeveloped area, the lower reaches of the stream pass by one or two fairly sizable towns. Local development factors have already been taken into account. The WRB has sent a letter to the University of Rhode Island, seeking to

25. The 1969 Statewide Comprehensive Planning Program, . . . , op. cit., p. 81.

assure the fullest possible cooperation in development of the project which affects university land. The state board agreed to reduce the size of the protective marginal area around the proposed reservoir with the understanding that the use to which the affected university land is put would not jeopardize water quality, and, if pollution occurs, the university would help to take corrective measures.

The Emerging Regional System

Although the land for the two projects is now in state ownership, opponents have not yet ceased trying to influence development plans by preventing (or at least delaying) the expected turnover of the land to the Providence Water Supply Board for development. As noted above, the Rhode Island Audubon Society, Citizens Committee for Clean Water and other critics still maintain the Big River project, which (in combination with Wood River Reservoir) deeds one-half of all remaining Rhode Island water resources to one Providence system, is wasteful and they favor a detailed study of alternatives. They allege that real costs would be far in excess of the \$77 million figure used by the WRB. The conservationist spokesmen seek to delay further progress for two years while an outside team (e.g., the Water Program at the Harvard Business School) makes an independent evaluation of economic costs and other alternatives. The conservationists would like to keep the land in state hands for limited development, but only after all other alternatives have proved infeasible. Prospects for their success are slim, however, although limited gains have been achieved.

On the other side of the ledger is the great influence and reputation of the Providence Water Supply Board. As noted above, the WRB and the General Assembly (where Providence power is strong) and the governor-- the major water resources "actors"-- all favor Providence expansion as regional developer. Added to this concentrated support are allies from outlying towns and cities which would be served by the system. Ten municipalities are now serviced by Providence, and under the plan nine others would be brought in. These newcomers include areas where water supply problems are now reaching crisis proportions-- notably the three Bristol County towns of West Greenwich, North Kingston, and East Providence. The Kent County Water Authority would also support the project, which it could tap. If the Statewide Planning Program's recommendations are accepted, support would also be forthcoming from the cities and towns on Aquidneck Island (including Newport) because Big/Wood water would then be transmitted to them also.

The Providence Water Supply Board indicated at least seven years ago its interest in becoming the regional developer of a major new water supply source. Former PWSB chief engineer, Philip Holton, stated in January 1963 that if the state did not act to develop a supplementary water source at Big and Wood Rivers, the city would have to take the initiative in doing so; and, three years later (by which time the Water Resources Coordinating Board had begun to acquire the site) Holton added. "If the General Assembly would choose Providence, there is no reason why we can't do the job." And, after a meeting in May 1966 at which Governor Chafee

disclosed the recommendations of the A. D. Little report, Mayor Doorley and Holton stated that Providence would be prepared to do the job "from start to finish."²⁶

Shortly thereafter action was taken by the state to provide an adequate response to what was then-- at the end of a long-term drought period accompanied by mounting water shortages-- perceived to be a looming water crisis within the state. Deliberations which ultimately resulted in the creation of the WRB were undertaken. In September 1966, Mayor Doorley and Governor Chafee agreed to have Holton act as consultant to a special task force named by the governor to speed working out of details as to who would carry out the Big/Wood project, and to avoid a city-state clash over the methods by which the project would be built, financed and administered.²⁷

There followed a controversy over the terms of the proposed transfer of property which resulted in creation of a formula by which the PWSB would reimburse the WRB an amount equal to 45 percent of the net cost of site acquisition. These funds would be used for projects in other parts of the state outside the PWSB service area.

Remaining to be resolved, however, was the continuing disagreement between the WRB and the city over terms for the lease. The WRB considered an alternative arrangement with the Corps of Engineers after

26. Providence Journal, January 17, 1963; Providence Evening Bulletin, December 23, 1965; and Providence Journal, May 11, 1966

27. The 1967 Statewide Comprehensive Planning Program, . . . , op. cit.

declaring that another developer would be sought since the negotiations were apparently hopelessly stalled.

The city has held out for favorable terms. Agreement was described as "imminent" in March 1970. If and when lease terms are agreed to, the WRB would have to hold public hearings on the Providence application.²⁸ Beyond that, no formal affirmative action is required by the General Assembly or the governor.

The Flat River Diversion

Floodskimming of the Flat River (adjacent to the proposed Big River Dam) would increase the actual yield of the Big River project by 13 mgd. While the NEWS draft engineering report lists development of the Flat River project as the second phase (immediately after Big) of the Big River complex, the WRB prefers to develop the Flat diversion last (i.e., fourth). Such ordering of the phasing schedule is favored by the WRB because it would delay introduction of lower quality water into the Providence system. Scheduling the Wood River project second (instead of Flat) conforms with present WRB-Providence plans.

As noted above, the WRB recognizes that water from the Flat River Reservoir (actually an arm of the river) is relatively poor quality compared to Big, Wood, and Moosup (the fourth element in the complex).

28. The engineering report noted-- "as a possible constraint to the projects as proposed"-- the fact that the additional nine municipalities to be served "would require approval," p. 254. Considering the outlying areas' desires for water, as well as the excellent relationship between the WRB and the PWSB, this is not likely to amount to an insuperable hurdle.

With respect to maintaining water quality downstream, the WRB will insure that the contract for development provides for minimum stream flow into the Flat and thence the south branch of the Pawtuxet. Details are not now available, however, and the Statewide Planning Unit observes that "the area surrounding this reservoir is highly developed, and no sewerage facilities are expected to serve the area until after the turn of the century. Maintaining a desired good quality in this source would present a problem, therefore, unless the reservoir could be protected by controlling the land surrounding it."²⁹ This may require procurement of easements or outright purchase. Both alternatives would greatly increase the projected development costs.

If releases are adequate, no substantial adverse impact upon fish and wildlife in the river is anticipated, but reduction of the river's natural flushing action could have adverse consequences on the downstream ecosystem. Environmental quality may be improved as a result of the project so long as the level of the reservoir is maintained constant (as is expected).

The existing ownership and water rights of the Flat River Reservoir pose a special problem. Before this diversion plan could be implemented, agreements would have to be entered into with respect to flowage rights possessed by old mill associations and transferred with the land to the present property owners. The shoreline is heavily cottaged now--

29. The 1969 Statewide Comprehensive Planning Program, . . . , op. cit., p. 81.

some 300 owners around the lake-- and the developer will be constrained by their rights. No property takings would be involved, however.

Moosup River Diversion

This project represents the final element in the proposed Big River complex. An add-on to the other Pawtuxet projects (Big and Flat), this project involves floodskimming the Moosup River to produce an additional 20 mgd yield for the Providence system utilizing a dam together with a small regulating reservoir at Buck Horn Brook (without the latter, the project yield would be 15 mgd).

Substantial flood control benefits would arise from this project, but the benefits would not accrue to localities within Rhode Island. The proposed dam would actually be located in Connecticut, just across the border. Towns and villages downstream in that state (the Moosup is a tributary of the Thames River) would enjoy the flood control benefits. In fact, the U. S. Soil Conservation Service and the state of Connecticut are proposing that the site in Connecticut be developed for flood control purposes. This could lessen the financial burden for Rhode Island since the federal government and Connecticut would pay for flood control benefits. While Rhode Island would have to exercise its condemnation power on Connecticut's behalf, Connecticut would reimburse Rhode Island for costs of such action. The proposed Soil Conservation Service dam by itself might not be economically justifiable, so there appears to be a built-in incentive for interstate cooperation here. The Moosup River water is of excellent quality and therefore fully suitable for water supply use.

However, the proposed SCS dam would have to be heightened by some six feet in order to produce the expected yield for this purpose.

Connecticut and the federal government would bear the costs of land acquisition. Flood control would probably rank as the first priority of uses, but there need be no inherent conflict between the flood control and water supply uses; nor would there be a conflict with recreational uses of the reservoir. Connecticut plans include park development around the reservoir in that area; and the Rhode Island Department of Natural Resources would develop similar facilities on the Rhode Island side of the border. In fact, the department is presently proceeding with the development around Carbuncle Pond (which would be inundated) to include boating and fishing. Land was purchased by the Department of Natural Resources for this purpose. It is expected that Connecticut would assign second priority of use (after flood control) to recreation, so whatever agency develops the site for water supply would be constrained by those terms. It is not certain in any case that the Providence Water Supply Board would be the developer; if so, a conflict with its restrictive recreation policy might arise. The difficulty is that while flood control needs are felt right now in Connecticut, development of Moosup for water supply would not be required until the latter part of the study period.

The project competes with plans for alternative development. Plans to develop some 7,000 acres of land near the site have been in the works for some time. Some 2,000 to 2,500 second homes would be built around recreation facilities by a company seeking a zoning change from the

town of Coventry. Also, there has been talk from time to time of developing a jetport in the area. Neither project would interfere directly with the development of the Moosup site; and neither one has been approved thus far. The Town Council rejected the developer's initial proposal unanimously after a packed and heated meeting, but the matter has still not been laid to rest. At the hearing, the general manager of the WRB stated that the second home development would prevent construction of the Moosup project because Roaring Brook, a tributary to the Moosup River, would be dammed by the developers to create an artificial lake. The area is quite sparsely settled now, with large lot zoning and little commercial development.

Tarkiln and Nipmuc Reservoirs

Although projects Tarkiln and Nipmuc are scheduled as year 2020 alternatives in the NEWS draft engineering report, WRB plans schedule them for 1990. These two projects for development of the Blackstone River Basin would initially involve a reservoir only at Tarkiln and flood-skimming from the Nipmuc. The water supply thus developed would serve the northern tier of the state. Planning reports dating as far back as 1928 have recommended development of the sites for water supply. As its second ranked priority (after creation of the WRB), the Governor's Task Force on Water Resources Planning recommended proceeding with the Nipmuc project: "Acquisition of this site is of extreme importance, particularly to the communities of Blackstone Valley which have the most serious water problems in the state."³⁰ The need for such development was also recognized

30. The 1967 Statewide Comprehensive Planning Program, . . . , op. cit., p. 49.

in the Water Resources Coordinating Board's Plan of Development and also, more recently, by the Statewide Comprehensive Planning Program and the U. S. Army Corps of Engineers.

Within the past decade there have been serious floods along the Blackstone River mainstem which flows through both Woonsocket and Pawtucket. Flooding dangers are less serious on the upstream tributaries around the reservoir sites.

Proposed alternative local development represents the underlying reason for opposition to the project. Plans are under way for three industrial parks of about 100 acres each in Burrillville, as well as development of a "country club" type residential area on the reservoir site just north of Harrisville. In November 1969 the Burrillville Town Council granted the developer conditional approval for this undertaking. Another possible conflict arises from the fact that an area in Massachusetts would be affected by construction of the Nipmuc Dam. It is not a growth area, and it may not actually be inundated (at least part of the tributary drainage area is in Massachusetts). That part of Massachusetts has been named in preliminary planning reports as a possible jetport site. Rhode Island planners, however, consider the two uses compatible if properly coordinated.

Local leaders have reflected residents' reluctance to give up land which produces tax revenue and which could be used for alternative development. A WRB spokesman has described opposition to both projects as "tremendous," and in this the record of the past five years bears him out. It is a classic case of source versus service area.

Despite the fact that earlier proposed legislation for site acquisition provided for in-lieu-of-taxes reimbursement "to some degree" in a diminishing scale over a 25-year period, Burrillville legislators and voters have exercised strength in successfully resisting site acquisition for the past six years. Bills supporting bond issues for Tarkiln-Nipmuc site acquisition died in committee (finance) in 1965, 1966, 1968, and 1969;³¹ and in 1967-- the one time the bond issue proposal got out of committee and was approved by the General Assembly-- the issue was defeated at the polls.

The 1967 referendum warrants closer examination with a view toward assessing the feasibility and implementation procedures for similar measures in the future. The WRB, the sponsoring agency, issued press releases in support of the bond issue, public hearings were held in committee, and WRB spokesmen presented their case at open board and Town Council meetings. Woonsocket and Pawtucket waterworks' managers also spoke out publicly in favor of the site acquisition. It takes a considerable amount of time and effort to publicize such an issue sufficiently-- especially in the face of local resistance-- and at the time the WRB, which was then just in the process of being appointed, lacked adequate staff, time and money to develop the campaign very fully.

Another problem was the fact that the issue was placed before the voters in a special election, which meant that voter turnout was quite low (about 5.7 percent).³² People over the state who supported the issue were

31. The original 1964 Big/Wood bond issue proposal passed in the legislature only after the Nipmuc project had been deleted from the bill.

32. Only 28,384 people voted on the issue; in 1968 there were 471,122 registered voters in the state (458,260 in 1966).

less strongly inclined to turn out than Burrillville voters, who opposed it ardently. In this situation, Burrillville carried far more weight than it would carry in a general election; with only about 1 percent of registered voters in the state, Burrillville accounted for about 7 percent of the votes in this election, voting against the measure by 1,911 to 103.

Even in Providence, where voters had nothing to lose directly and where Democratic political leaders sought to bring out the vote, the reservoir bond issue was approved only by a narrow 1,711 to 1,692 margin. Burrillville, with one-nineteenth as many registered voters as Providence, mustered more votes in opposition than Providence could muster in favor! What is even more surprising, the measure was only narrowly approved in Pawtucket (1,682-1,650) and was actually defeated in Woonsocket by a greater than two to one margin (1,073-500). The size of the overall margin -- 16,533 against, 11,851 for-- is accounted for in part by substantial opposition in other communities as well since supplemental Big/Wood bonds were also included.³³

The citizens of the Blackstone Valley communities, who would be the beneficiaries, find themselves without concerned allies on this issue.

Cost escalation has not made the issue any more attractive. Originally a \$1 million proposition in 1965, the bond issue amount grew in succeeding years to \$1.5 million, \$2 million, \$3.8 million, \$6 million, and finally \$6.5 million in 1970.

33. The item appeared on the ballot as "Reservoir site acquisition (Nipmuc River and Big River-Wood River) bonds not exceeding \$4,000,000." Voters in 30 of Rhode Island's 39 towns rejected the measure.

The appeal that "the board should listen to the people" carried weight in the legislature, and when the legislation authorizing the creation of a development fund for the WRB was being considered, an amendment prohibiting the use of the funds for site acquisition was successfully added. The motivation behind the amendment is said to have been the desire on the part of Tarkiln-Nipmuc foes to prevent the WRB from bypassing the General Assembly. Although a bill was introduced in the 1969 session to provide for another bond issue referendum, Governor Licht's decision not to support the measure led to its early death in committee.

Late in 1969 the Burrillville Town Council conditionally granted a zoning change for residential development at the Nipmuc site to a developer. William McDonald of the WRB registered the board's opposition to the zoning change at the meeting, noting the WRB's plans to reintroduce legislation in support of the Tarkiln-Nipmuc project.

WRB members as well as statewide planners believe that Burrillville, which is served by eight private systems and one institutional systems, will experience water shortages before 1990. According to the Statewide Comprehensive Planning Program report, Burrillville will have a small surplus of supply over demand in 1980 (approximately +5 percent) and a small deficit in 1990 (approximately -5 percent).

The need for Tarkiln-Nipmuc development is already apparent among officials in the towns that would be prime takers-- Pawtucket, Woonsocket, Cumberland and Lincoln. In a report issued in 1969, former

Pawtucket Water Superintendent John A. McManus (also a former WRB member) stated that Pawtucket faced a 75 percent chance of mandatory restrictions on water use in 1970 or 1971. In addition to proceeding to enlarge its Diamond Hill reservoir, McManus stated that the town must not fail to "bring pressure on the state for development of the long discussed Nipmuc-Tarkiln Reservoir to serve water needs ten to fifteen years from now or sooner."³⁴

In Woonsocket, the shortage is particularly serious because part of the city's present source is polluted. Woonsocket has a reservoir on the Mill River, which is not yet operational. Before it is used, the water will have to be treated. Secondary treatment facilities are planned. The river flows down from Massachusetts, so Rhode Island has no effective control on the source. The state Health Department reportedly would like to talk the city out of using this source for its water supply.

How Pawtucket, Woonsocket and the other Blackstone Valley towns that will need water soon are going to bring pressure to bear on the state for site acquisition remains to be seen. If no intrastate remedies are available, it is conceivable that the cities needing water could have recourse to their congressman who has an excellent record in going to bat for his constituents with federal agencies. Since Pawtucket abuts Providence and is relatively far from Nipmuc-Tarkiln, it might also be possible to amend present plans so as to hook Pawtucket's lines into the Providence

34. Providence Journal, November 23, 1969.

system for a supplemental supply. At this time, however, Pawtucket and Woonsocket appear to be looking to the state WRB for relief. The state board could become a developer for these two projects. As for a possible local role, McManus urged the prime takers to form a regional compact so each community would get a portion of the safe yield of the project; but because of serious financial problems and lack of staff it is considered unlikely that Woonsocket could even hook into a new system on its own.

South Central Rhode Island Ground Water

This project is designed to develop ground water sources in the upper Pawcatuck basin to serve Jamestown and Newport, where water needs are already perceived for the short-term. No impending crisis is felt in the south central area, although some problems have been encountered with existing ground water sources. However, state planners anticipate considerable growth for the region in the future, and the Statewide Planning unit has proposed that local ground water sources be reserved for such future needs.

No local opposition is known at present. Only a very small amount of land acquisition would be required (12.5 acres per well). Neither the WRB nor the Providence system is viewed as likely to be willing to become developer of these sources. No metropolitan system is served by ground water at this time the biggest ground water system is 2-3 mgd for some smaller communities; this project involves an expected yield of 11 mgd. A study by the United States Geological Survey indicated a possible yield of

25 mgd, but to withdraw this amount would, over a period of time, and particularly in the drier months of the year, tend to seriously diminish the flows of every river and stream in the basin. The WRB has recommended 8 mgd as a safe amount to withdraw.

Taunton River Estuary Dam

This project, which would serve Bristol County, part of Kent County, Providence and Newport County, is listed in the draft NEWS engineering report but does not appear in Rhode Island state plans, which are designed to satisfy all needs up to 1990 through development of intrastate sources. In the words of the chief state planner, "We'll have to do something substantial (for that part of the state) by 1980." The Statewide Comprehensive Planning Program opts for transporting Big/Wood water under the bay to Aquidneck Island; and the WRB favors using south central ground water for this purpose. Plans are already under way to tie Bristol County towns into the Providence systems, and some interest has been expressed locally in having the line extended to Newport County.

Cleanup of the Taunton River is essential to the project as listed because industrial and other wastes would have to be piped around the dam and into the estuary. Provision of a boatlock would mean that boating would not be seriously impeded. In fact, boaters would probably welcome the new, relatively protected area for their sport (the project would also increase hurricane protection, but there is not very much development at this time beyond the site of the proposed barrier). Nonboating

recreation might be hurt by the project, especially crabbing and other uses of the estuarine habitat, which would be damaged.

Similarly, the project would result in a loss of ecological diversity and variety of species. Salt marshes, which are in short supply in this area, would be made even more scarce. A diversified ecological system would be transformed into a fresh water lake system.

However, the area near the project has been in a depressed state economically since the 1930's, and possibilities for local development-- vacation colonies, etc.-- would probably be enhanced by the development of a new body of water. Apparently there is lively speculation in the area now; and, if no action is taken, development of the area might be foreclosed.

This project is interstate. Rhode Islanders resist importing water from out-of-state until all intrastate sources are developed, especially since intrastate sources appear to be superior in quality. Water supply "actors" in the state are also reluctant to sacrifice their present autonomy.